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Contents:

	PAGE
Signs of Activity	137
The E.A.W. at Newcastle	138
The Lighthouse Conference	138
Electrical Heating by Radiation, by C. W. Spiers *(illus.)*	139
The E.H.P. Conference at Paris, by R. Borlase Matthews	142
Long-distance Telephone Cables, by A. Engelhardt and H. C. Turner *(illus.)*	144
Trade Unions in Conflict, by J. W. Thomas	147
The E.A.W. Conference *(illus.)*	149
Electrical Accidents and their Prevention in Households, by Miss K. Bohm	151
The Progress of Electricity in Holland (with particular reference to Rural Areas), by Mrs. E. J. Van Waveren	151
Business and Industrial Notes	152
Lighting and Power Notes	157
Tramway and Railway Notes	158
Telegraph and Telephone Notes	159
Radio Notes	159
Contract Information	159
Forthcoming Event	161
Notes	161
Our Personal Column	163
Financial Section—	
New Companies Registered	164
Official Returns of Electrical Companies	164
City Notes	165
Stocks and Shares	165
Swedish Electrical Exports	167
Indian Electrical Notes	168
The Spanish Electrical Market	168
The International Lighthouse Conference	169
Modern Switchgear and Transformers *(illus.)*	170
The International Aero Exhibition *(illus.)*	172
The North-East Coast Exhibition *(illus.)*	174
The Mascarini Boiler *(illus.)*	175
Domestic Electrical Developments *(illus.)*	176
Reviews	177
Parliamentary News	178
Correspondence—	
The Inspection of Installations	179
Published Specifications	179
Trade Mark Applications	179
New Work for Contractors	180

Signs of Activity.

THE ELECTRICAL REVIEW has always appreciated to the full the vital necessity of foreign trade to our manufacturing industries and its policy has constantly been directed to the promotion and fostering of movements designed to increase British exports to Dominion and foreign markets. Consequently we have observed with gratification a number of signs that considerable activity is awakening in this most important direction.

One of the institutions concerned with foreign commerce is the Department of Overseas Trade, an instrument capable of doing a great deal of good work if properly directed. It cannot be said that this Department has accomplished all that it might have done, but that may have been due to the general attitude of Government and business interests towards it. Even now we believe that it lies under penalty of abolition—we cannot remember the quashing of the sentence.

The new Government sees in the Department one means of furthering its employment plans and apparently intends to strengthen its services. One important decision has already been taken: a third Trade Commissioner is to be appointed to Australia. This will mitigate, to some extent, the absurdity of the present situation in which two men (one in Sydney and one in Melbourne) are expected to keep abreast of all financial, economic and commercial movements in a whole continent. It has also been decided to re-open the Singapore post which was closed for "economy's" sake in 1922. As was recently pointed out (ELEC. REV., July 12th, p. 84), Malaya is assuming greater and greater importance as the gateway to Far Eastern trade and cannot be adequately looked after by a Commissioner stationed in New Zealand.

The appointment of another Commissioner to Australia may be one of the results of the report of the British Economic Mission of which Sir Hugo Hirst, Bt., was a member. Both the Home and Commonwealth Governments are likely to derive considerable benefit from close attention to this report.

Another mission which has tremendous potentialities is that which sails on August 2nd for a tour of the principal centres of Argentina and Brazil. This last act of the late Government was one which we particularly

welcomed. It fulfilled a desire which we had long expressed that a thorough investigation of a number of markets should be made and more especially those of South America. In one respect, however, we were not altogether satisfied. Although electrical development on a considerable scale is proceeding, and must continue to proceed, in Latin America there was no member of the Mission directly in touch with electrical trade matters. The strength of our foreign competitors in these great countries leads us to fear that non-British standards may be set up to which our manufacturers may find it difficult or impossible to conform. We have in mind the situation that developed in Canada which we hope will not be allowed to recur elsewhere. Our fears on this score are now somewhat relieved by the appointment of Mr. W. Howard-Williams to the Mission in the place of Mr. G. E. Rowland, who finds that he is unable to go. We say this without disrespect to Mr. Rowland for Mr. Howard-Williams is perhaps more conversant with electrical conditions in Argentina, and its neighbouring countries. He is an active director of the Central Argentine Railway Co., which was a pioneer of heavy electric traction in the Republic, and is at present carrying out further electrification, employing British equipment (Metropolitan-Vickers). He is also a director of the United River Plate Telephone Co., Ltd., which, although now under American control, has undertaken to purchase its equipment in Great Britain so far as is "reasonably practicable." It is to be hoped that the visit of the Mission will draw attention to the British Trade Fair which is to be held in Buenos Aires from November, 1930, to February, 1931 (the Argentine summer). Such fairs are another potent means of bringing British goods before the notice of the foreign buyer.

An attempt to open up some of the smaller British markets is embodied in the Colonial Development Bill now before Parliament. This seeks to encourage, by way of grants to the local authorities of certain Colonies and mandated territories, the development of water power and mineral resources and the improvement of transport and communications, to mention only one or two matters likely to interest the electrical industry.

All these movements should be closely watched, supported and followed up by British electrical manufacturers. While Government missions (may there be more of them!) can only prepare the ground and help in sowing the seed, the responsibility of fostering the growth of trade rests upon the manufacturers and their agents, who in due time should reap the fruits of their labours.

The E.A.W. at Newcastle.

THE decision of the Council of the Electrical Association for Women to hold its fourth annual conference at Newcastle was a fortunate one, for two reasons: the first, because it gave an opportunity for paying a tribute to the courageous bid by a leading industrial town for the recovery of its former prosperity; the second, because it is to the North-East Coast that we have become accustomed to look for pioneer work in the electrical field.

The departure from the custom which has hitherto prevailed of holding the annual conference in London was fully justified by results, as, apart from the great attraction of the North-East Coast Exhibition, there is much on Tyneside to stimulate the interest of a generation grown used to mechanical progress.

During the four years of its life the E.A.W. has been growing in membership and repute, until it has fulfilled the expectations of its founders in becoming one of the most important electrical associations in the country. It has also created considerable interest abroad, since it is the first body of its kind in the world.

In the ELECTRICAL REVIEW of June 21st, p. 1118, we quoted the opinion of an eminent engineer to the effect that domestic electrification offers the greatest field for development of any, provided women do their share in this field. Just as men have introduced the electric drive to industry, so must women electrify the home.

In spite of its potentialities, which cannot easily be over-estimated, the E.A.W. has attracted no more than a discreet publicity to its proceedings. This is probably to the good, taking count of the objectionable kind of public curiosity that might otherwise have been expected. The movement has far too great a practical bearing on the future of electrical development to be regarded in any other way than on its merits as an association for promoting that end. Judged from this view point alone, the papers read at Newcastle are highly useful contributions and worthy of permanent record.

In assessing the value of any association it is customary to inquire (1) its objects, (2) the character and qualifications of its supporters, and (3) the efficiency of its organisation. The objects of the E.A.W. will appeal to all to whom electrical development seems desirable. The chief of these were stated in brief by the president as (*a*) the education of women in the uses of electricity, and (*b*) the expression of the women's point of view on matters electrical. With regard to the latter, one fruit of the Association's work is seen in the "Outlet Campaign," the promotion of which has now been taken over by the Electrical Development Association. The supporters of the E.A.W. include the most distinguished engineers and laymen of both sexes, while it is obvious to anyone attending its conferences, or having any other dealings with its officers, with what efficiency its business is conducted.

At Newcastle one could not but be conscious of an atmosphere of disciplined enthusiasm—the enthusiasm of men and women of affairs who had come together, in many cases at personal inconvenience, to discuss subjects which appeared to them of first-class importance. We have no hesitation in recommending all who desire, from whatever motive, that the use of electricity in the home should be extended, to give their support to the Association.

The Lighthouse Conference.

THE London International Lighthouse Conference was necessarily an important function, notwithstanding that it was of an informal character and was not authorised to make decisions which would bind any of the countries represented. There was no mistaking the international character of the Conference, which was of a very specialist character, but the outstanding feature was the manner in which the safety of ships and those that go down to the sea in ships is being more and more entrusted to electricity. One may cite electric lighting for lighthouses and lightships (although there appear to be cases even now in which electricity may not be the most practicable illuminant) wireless telegraphy, wireless telephony, and the control by wireless of distant unattended apparatus. There can hardly be a sphere of human activity concerning which there should be such real and effective international co-operation than the lighthouse and allied services of the world, and the London Conference of 1929 demonstrated fully how all concerned are striving to apply science to the service in the fullest possible sense. Our brief report of the Conference, which is continued elsewhere in this issue, indicates the range of subjects dealt with. If there should ever be another similar conference in London we would venture to suggest that the secretariat should have a little more consideration for the technical Press. Copies of the papers were not available, except the one that was invariably handed to the official reporter, and those whose duty it was to endeavour to record the proceedings in a more precise manner than is necessary for the daily Press could hardly do justice to long and highly technical contributions by a five-minutes' hurried glance through such documents before they were taken away from the Conference room.

There is little doubt that the greatest good will come of the Conference, even if it is regarded merely as an opportunity for the responsible chiefs of the various lighthouse services of the world to exchange views and compare the work that is being done in different countries.

Electrical Heating by Radiation.

Comments on the advantages of the use of radiant heat, and notes concerning some installations employing "Morganite" heaters produced by the Morgan Crucible Co., Ltd.

By C. W. SPEIRS, M.I.E.E.

EXPERT opinion on methods of heating small and large buildings has undergone considerable change in recent years, and central heating, which at one time was the universal alternative to coal fires, is now being largely replaced by other systems which depend on entirely different and more scientific principles. Central heating is purely a method of air heating, whereas the newer systems depend more largely upon the principles of radiant heat applied in special ways. The expression "radiant heat" is strictly a misnomer, but it is a convenient term which implies the sensation of warmth produced by a gas or coal fire, or the sun's rays, without the intervention of heated air. Radiant heat is not only emitted from red-hot sources of heat, but surfaces heated to comparatively low temperatures from 100 deg. F. upwards are equally capable of transmitting two-thirds or more of the total heat in this way. This, however, is conditional upon the source of heat being sufficiently large in inverse relation to temperature, and so disposed as to face the interior of a room or the objects in it that are to be heated.

Such conditions are met in practice, either by heating internally sections of the ceiling or wall of a room to 100-120 deg. F., or by using much smaller independent panels with a surface of 2 sq. ft., or less, heated electrically to higher surface temperatures, up to 550 deg. F. The amount of radiation from radiators of this latter type is very high, and it is possible to mount them in any convenient position, either high up on a wall or suspended from a ceiling. In this manner radiant heat can be directed and spread uniformly over a wide area with maximum useful effect, as depicted in fig. 1. The system is also very flexible, as there is no necessity to heat up large masses of masonry, as when wall or ceiling panels are employed.

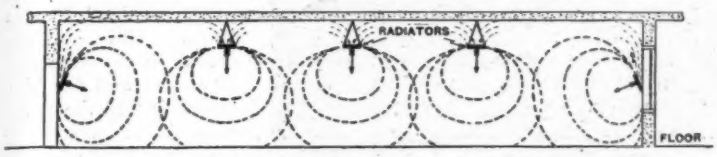


Fig. 1.—"Spread" of Heat from Ceiling and Wall-suspended Radiators.

The general advantages of radiant heat, as opposed to air heating, have frequently been discussed in the technical Press, but it may be convenient here to enumerate them. Radiant heat will produce the same feeling of warmth in a room in spite of a lower air temperature; this induces a feeling of freshness rather than of stuffiness so commonly associated with central heating. It will be seen that air temperatures cannot be accepted as a criterion of the degree of comfort felt by an individual heated by radiation, and, furthermore, the heat loss through walls and windows will be less, owing to the lower permissible air temperature. Objects in a room when exposed to a source of radiant heat become warmer than the surrounding

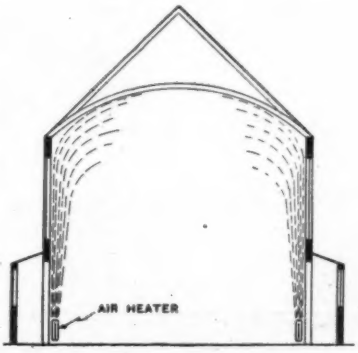


Fig. 2.—Air Streams from Hot-water Heaters.

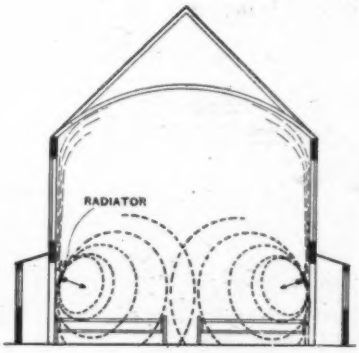


Fig. 3.—Radiant Heat from Small Heated Panels.

Fig. 4.—Club Smoking-room Installation.

air, so that loss of heat due to ventilation is less and the thermal efficiency is, therefore, improved. When air heaters are used to warm a building which only requires

Fig. 5.—First Church of Christ, Scientist, Kingston-on-Thames.

occasional heating, such as churches, halls, &c., the temperature of the walls will lag behind that of the air, and during this time the occupants will lose heat to the walls to their own discomfort; the use of radiators counteracts this cooling effect. Radiant heat becomes effective immediately the radiating surface becomes warm, and the loss of time and waste of heat occasioned by raising the temperature of the air in a lofty room or building is obviated. Fig. 2 illustrates how streams of warm air rise from hot-water heaters, whereas fig. 3 indicates how radiant heat can be directed downwards from small heated panels, with only a small proportion of the heat being transferred to the air. The unpleasant effects of cold down-draughts from skylights can be prevented by suspending radiators in such a way that the radiant heat is projected downwards, so as to counteract the chilling effect. The small proportion of air heating produced by the radiator at the same time reduces the degree of the down-draught itself.

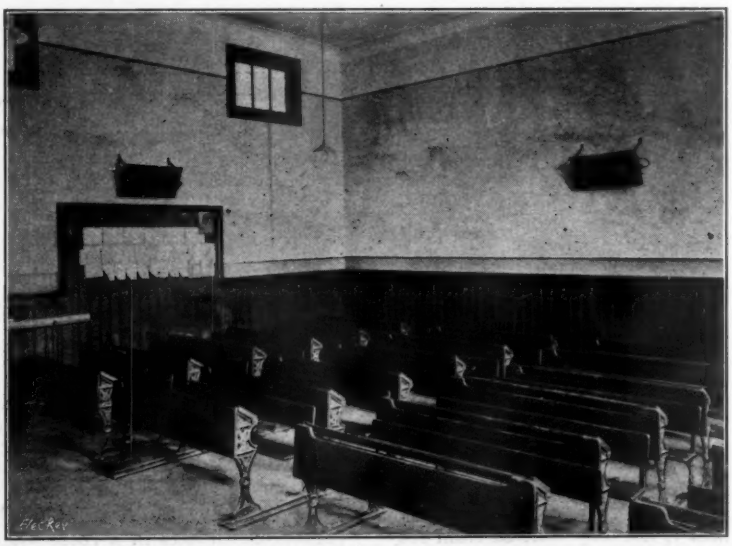


Fig. 6.—A School-room Installation.

Fig. 7.—Another View in the Kingston Church.

The particular form of electrically-heated panel here illustrated is known as the "Morganite" radiator (ELECTRICAL REVIEW, June 13th, 1924, p. 958), a section of the element of which is shown in fig. 15. It consists of a glazed fire-clay tile, $\frac{5}{8}$ in. thick, in which is embedded a graphitic resistor of ribbon section. The area of the resistor approximates closely to that of the element, and it is, therefore, possible to obtain a high degree of uniformity of surface temperature; this is illustrated by fig. 9, which is a reproduced photograph of a scorch print obtained from a 25 in. by 13 in. element. Owing to the large surface area and the high emissivity of the material, it is possible to employ a load of 1,750 watts for the above size of element without exceeding the maximum permissible temperature of 550 deg. F. The material of which the resistor is made is not subject to atmospheric corrosion, and it is partly for this reason that the radiators are so widely used at sea. When suitably mounted, these radiators will emit up to 85 per cent. radiant heat.

The accompanying illustrations, figs. 4 to 8, 10 to 14, and 16 show examples of the application of "Morganite" radiators

in various classes of rooms and buildings, and it will be seen from these that the system is extremely flexible and applicable in cases where embedded panels would be unsuitable. Fig. 4 shows an installation of radiators mounted on the tops of the bookcases in a club smoking room, and illustrates the adaptability of panel radiators in cases where wall space is not available. From the positions above the bookcases the radiators distribute their heat evenly over the floor area. It may be noted that the radiators have been coloured to match the ceiling, and are thereby rendered somewhat inconspicuous. Fig. 12 represents part of a drawing office equipped with the radiators. In this office, which has a volume of approximately 39,000 cu. ft., a total load of about 39 kW is divided between thirteen 1,750-watt radiators, mounted from 7 to 8 ft. up on the walls, and sixteen 1,000-watt ceiling-type radiators, suspended from 10 to 12 ft. above the floor.

An installation in a hall in which the walls are panelled for a height of 10 ft. above the floor is shown in fig. 8. In this case there are two central-heating convectors under the windows, which, in themselves, are incapable of providing sufficient heat. Fig. 11 shows a method of employing radiant heaters in corridors or narrow passages without in any way causing obstruction. As an alternative, radiators suspended from the ceiling may be used. A school installation is depicted in fig. 6. The use of this type of radiator has the additional advantage of placing the source of heat well above the reach of children, thus obviating the necessity for elaborate guarding. Figs. 5 and 7 are of particular interest in that they represent a recently constructed church-heating installation. The overall width of the church is 40 ft. No radiators are installed in the side aisles and, as the width between the columns is only 30 ft., it is not necessary to suspend radiators from the centre of the ceiling. The maximum height is 37 ft., and the total volume of the building is 62,850 cu. ft. Owing to the high proportion of radiant heat emitted, the air space above a

Fig. 10.—Dining Saloon on s.s. "Viceroy of India."

Architects, Sydney Tatchell, F.R.I.B.A., and Geoffrey C. Wilson, F.R.I.B.A.

Fig. 8.—Hall of Chartered Institute of Secretaries.

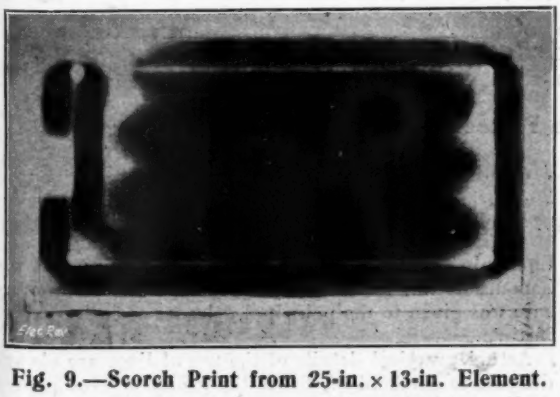


Fig. 9.—Scorch Print from 25-in. × 13-in. Element.

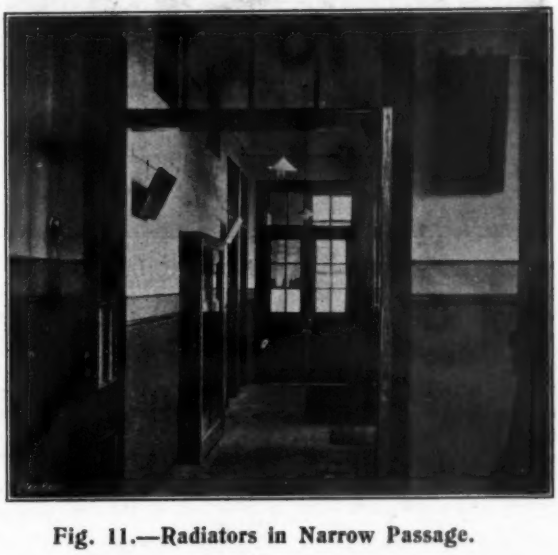


Fig. 11.—Radiators in Narrow Passage.

Fig. 12.—Drawing Office Equipped with "Morganite" Radiators.

plane 15 ft. from the floor may be ignored, except in extreme cases, as, for example, when the roof is entirely made of glass, and on this basis a load of 30 kW has been provided for a reduced volume of 30,000 cu. ft. The

Fig. 13.—Alley-way Radiators on M.V. " Alcantara."

Fig. 14.—Part of a Church-heating Installation.

radiators mounted on the walls and columns are of 1,750 watts loading each, while the two on the foot of each pillar at the end are 750 watts each, fig. 7, as also are the seven 25 in. by 5 in. radiators on the beam under the balcony, fig. 5. The latter part of the church, when used, will be separately heated by three 1,750-watt radiators, the wiring points for which can just be discerned in fig. 5. A number of additional radiators, totalling 14 kW, are also installed in vestibules, organ chambers, &c., for local heating. Fig. 14 shows a somewhat similar church-heating installation. In this case the primary consideration was the prevention of condensation on the valuable mural paintings, and the radiators were, therefore, given rather less slope than usual.

In certain cases it may be considered essential to mount radiators low down on the walls, as shown in figs. 10 and 16, which are, respectively, views in the first-

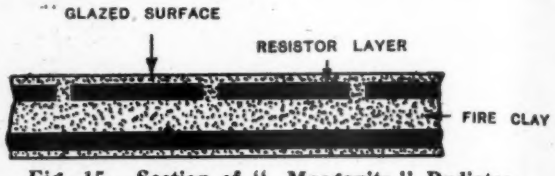


Fig. 15.—Section of " Morganite " Radiator.

class dining saloon and writing room on the s.s. *Viceroy of India*. The radiators may be seen mounted in recesses in the walls. As is usual in shipwork, the space is exceedingly confined, and it is difficult to avoid screening the recesses with the furniture. In this connection, it is

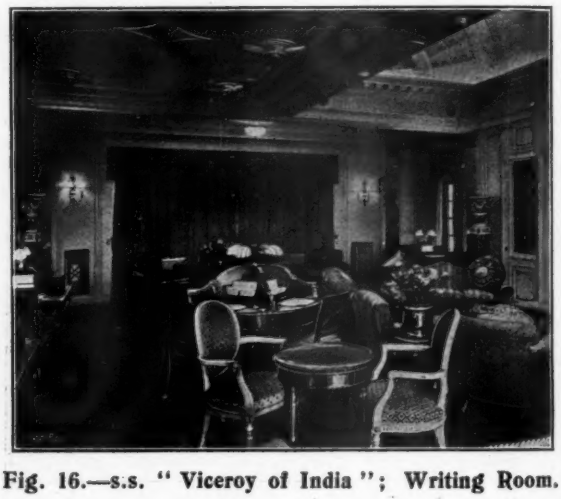


Fig. 16.—s.s. " Viceroy of India "; Writing Room.

of interest to note that in a liner at present under construction a large number of radiators are being mounted overhead in alley-ways and cabins. Fig. 13 shows a line of 3-kW radiators mounted in the alley-way of a ship. These radiators throw their radiant heat on the inboard bulkheads of the cabins, thereby causing them to rise in temperature and in turn supply radiant heat to the cabins. This is the sole source of heat to the cabins and has been found by experience to be effective.

The E.H.P. Conference at Paris.

A Review of the Proceedings.

By R. BORLASE MATTHEWS, Wh.Ex., A.M.Inst.C.E., M.I.E.E., F.R.Ae.S.

(*Concluded from page* 108.)

DURING the last two days of the Conference details of the practical operation of overhead lines were discussed. Mr. Parodi acted as the special reporter for this section, being assisted by Mr. E. Gevaert (Belgium)—operation of networks; Prof. C. Budeanu (Rumania)—reactive energy; and Mr. C. E. Montañès (Spain)—surges. The following acted as chairmen of the various sessions:—Messrs. U. Del Buono (Italy), H. W. Young (U.S.A.), and Prof. M. Chatelain (Russia). It will have been observed that the honour of chairmanship of each section of the Conference was given to the principal delegate of each country in turn.

Actual practical details of the use of lines are always difficult to get hold of, hence the group of nine papers dealing with this subject were of special interest. Mr. Habich described the troubles experienced on the Swiss Federal Railway lines due to the excrement of large

birds, which, incidentally, are not electrocuted, but always fly away frightened by the flash. Bird guards, 2 ft. long, with either a sharp edge or with pointed teeth, have very considerably reduced the number of faults. Horns placed at right angles to the line are preferred as arcing shields, since damage to the line itself is better avoided.

The modern method of dealing with accumulations of snow on lines is to melt it off, according to Japanese (Mr. S. Fukunaka and Mr. T. Uyeno) and French (Mr. Barrère) experience; 400 amperes for about half an hour is required for this purpose.

In a paper by Mr. F. G. Baum (U.S.A.) it is pointed out that for a 220-kV three-phase line, 25,000 kVA per 100 miles is required to charge the line. The author advocates the constant-potential transmission system for large power lines, with the aid of synchronous condenser voltage control. This view led to considerable discussion, as a number of engineers do not approve of the "Baum" principle referred to above.

Messrs. P. V. Hunter and J. F. Watson read a paper dealing with the dielectric disturbances arising in super-voltage (33 kV and over) multi-core cables from the thermal expansion of conductors. It is not generally realised that a well-loaded conductor will increase its length by 8.3 cm. per 200 metres if the temperature is increased 25 deg. C. It is deduced that many faults have been caused by such expansion. The difficulty is overcome by the employment of joints designed for spring tensioning, which are referred to as static tensioning methods. Mr. W. Fennell (president of the Overhead Lines Association) gave a description of the Mid-Cheshire method of distribution*, which is a ring, or open ring, 33-kV system passing near the towns and larger villages. This means that every small town, or works, or rural area, has a duplicate supply, and also that the opening of new works finds an ample supply of power awaiting it only a short distance away, with a primary pressure that is almost the same everywhere, at all times, independent of the loading.

Mr. E. Uytborck (Belgium) exhibited a map and explained the distribution of the interconnecting e.h.p. lines in his native country.

Everyone is so accustomed nowadays to the almost universal three-phase a.c. distribution system that the twenty odd installations of Thury plant are generally overlooked. In the scheme for the utilisation of water power at the Asuan dam, described by Mr. A. A. Ahmed (Egypt), owing to the exceptionally great distance over which the power will have to be transmitted (about 570 miles) it is proposed to adopt the Thury system for the reason that 300,000 volts can be employed as the operating difference of potential, and yet the insulation need not exceed that required for 150,000 volts to earth, since the middle point will be earthed. Naturally the reference to such long-distance distribution gave rise to considerable discussion. Mr. C. R. F. Nuttall provided some useful notes on load-dispatching with more particular reference to the control of electric power on large systems in the United States. He advocated giving more and more responsibility to the load dispatcher. Incidentally, he mentioned that both public and private telephone systems using special wires were being superseded by carrier-current communication systems (induced high frequencies superimposed on power transmission, distribution, and other lines).

The "something for nothing" idea has always a very strong appeal: hence, methods of super-posed, wired-wireless, and similar communication schemes which employ the existing transmission lines are always of interest. This principle has recently been carried a stage further by its application to the remote control of stations for generating and distributing power. Mr. W. Walty described such a system, which not only controlled remote switches, but also signalled back their positions and provided for the reading of the instruments in the distant stations. Mr. Chirol read a paper dealing with the remote control of multiple-tariff meters. This method enables all clockwork, its adjustment, and its winding to be dispensed with.

Mr. F. Rutgers explained a new and simple graphical method of representing actual power and wattless kVA by means of improved vector diagrams.

Mr. P. Sohie supplied some notes concerning Belgian practice with regard to the measurement and tariff listing of re-active energy. Mr. A. Illovici dealt with the measurement of effective and reactive energy in high-voltage circuits, in which he claimed that there was now no special difficulty other than the high cost of the transformers. However, he foreshadowed that they would soon be replaced by other devices, such as resistances or reactances, in series with the pressure circuits of watt-meters and electro-dynamic wattmeters. The main difficulty at present is that of the insulation of this apparatus. Prof. A. Barbagelata drew attention to the possibilities of measuring all the values of a three-phase system by means of four ordinary single-phase meters, and demonstrated how it could be accomplished.

Some tests on the effects of grounding the neutral on the 130-kV lines of the Cisalpina Company in Italy were quoted by Mr. L. Maggi. No trouble had occurred with telephone lines due to the earthing.

Six papers dealt with the subject of surges, two of them being of British origin. Mr. L. C. Grant described the principles of the electro-magnetic and electro-static surge absorbers with which his name is associated. He stated that the former type was most in use. Mr. R. O. Kapp described some of the newer developments in the selective protection of transmission lines as applied during the last twelve months in Great Britain. Mr. A. Hiovici, in an exhaustive paper, covered protective devices whose operation is based upon the out-of-balance of current, pressure, and power. As the use of devices of this nature obviate the employment of a pilot wire, their consideration is of considerable importance.

A paper by Mr. Rieunier described the steps taken to standardise a frequency of 50 cycles in Paris and its environs. In 1919 only 27.6 per cent. of the output was at 50 cycles, but to-day it is 90.5 per cent., and the remainder will be completed by 1930. Details are given of the procedure adopted. It is very interesting to read a paper of this nature, so as to see the viewpoint of French engineers on this vexed question for comparison with British views. The author states that they have no cause to regret the time and money expended upon standardisation.

Mr. T. Norberg-Schulz, as chairman of the Statistics Committee of the Conference, presented a draft form for collating power-station statistics, to which Mr. W. B. Woodhouse also contributed. The tables are filled in for Canada, Denmark, Holland, Norway, Great Britain, Switzerland, and Japan. The tables are to be further completed by the Union Internationale des Producteurs et Distributeurs d'Énergie Électrique.

Though the papers were numerous, it is hoped that our necessarily very brief comments will serve to give a general indication of the trend of the Conference and also act as a guide to the original papers on any subjects of particular interest. It is obvious that the extra-high-voltage transmission of electric power has become very highly specialised and, further, it is abundantly evident that there is a great deal more about it that has yet got to be learned. This is, in effect, a strong argument in support of the work of the Overhead Lines Association. Over and above the information obtained from the papers, informal discussions supplied the solutions to many problems. One of the American members told the writer that he had just been inspecting the latest rarified tube-type lamp. This is now ready for commercial production for use direct on 220-volt circuits and is filled with a gas that gives a very close approximation to daylight. If the commercial lamp can compare with the laboratory model, the electricity supply industry will shortly be faced with another serious problem—far worse than the introduction of the gasfilled lamp—still it will only be temporary, as users will easily be persuaded to employ more light.

* See ELEC. REV., July 12th, 1929, pp. 62-64.

Long-distance Telephone Cables.

How and Why They are Placed Underground.

By A. ENGELHARDT, D.Ph., and H. COBDEN TURNER, M.I.E.E.

MOST people will have noticed that many of the main and arterial roads are now denuded of the old familiar telegraph poles and wires; instead of them one finds, if one looks, miniature grave-

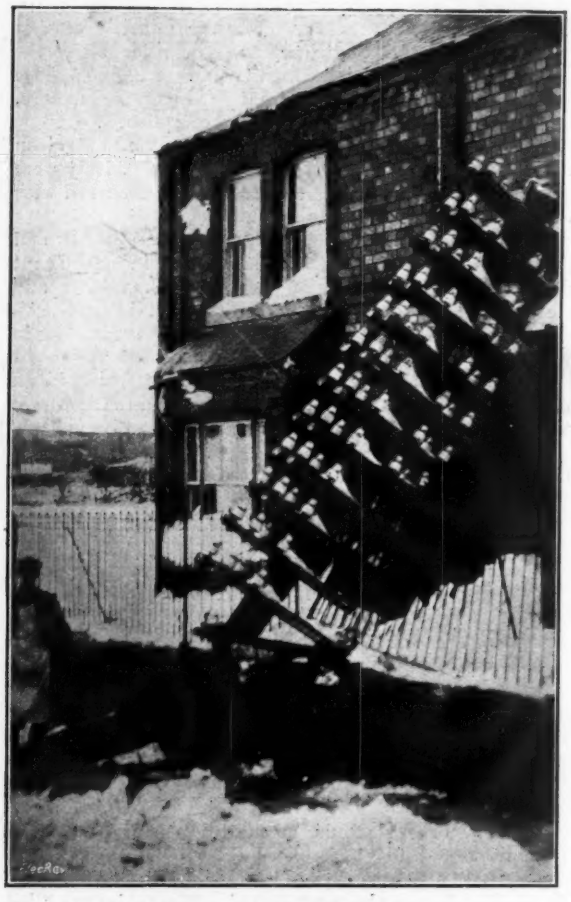


Fig. 1.—Fractured Pole.

stones tucked away in the hedgeside, marking the places of buried joints in unseen, highly efficient, underground telephone cables.

This change, which is rapidly altering the appearance of our countryside, is due to recent inventions and developments in the art of communication by electricity, whereby it is now possible to accommodate in a 3-in. duct many more circuits than would have filled all the poles along all the roads, railways and canals.

These underground cables, with their attendant loading coils and repeaters, are very efficient and theoretically can be extended to any length, and with them there is being built up in Europe a network of international telephone lines. These lines no longer regard national frontiers, but continue, usually by the shortest route, to link up the cities of the Continent as formerly they linked up the towns of each separate State; with the result that the most remote places are now within a few moments call of each other.

At present the longest underground conversation which can take place is between Glasgow and Budapest (1,600 miles), and the second longest is between St. Louis and Boston (1,430 miles).

Even before the war there existed one or two international trunk lines, the most important of which was the 750-mile line between Berlin and Milan. That line was overhead and was made of 4.5 mm. bronze wire, loaded every 6.6 miles.

Unfortunately lines of that type were subject to frequent breakdowns; a liability which naturally increased with the length of the line. The traffic being thus subject to interruptions, was small, irregular, and unremunerative, and, in consequence of its unreliability, never entered into the life of the people in the way now possible with underground lines.

The desire to free the trunk lines from mechanical faults and breakdowns, due to storms and atmospheric conditions, see figs. 1 and 2, gave rise to the idea of using underground cables, and this received a further impetus by the uprising and spread of overhead power lines, grid systems, and electric railway routes.

The possibility of dangerous connections by actual contact between the two systems (the overhead telephone and the overhead power lines at high voltage) is obvious to all, but what is, perhaps, not so generally realised is the possibility of induced voltages from the power lines to the telephone lines, causing not only interference with the service, but even danger to the operators.

The aim of this article is to give a short survey of the various problems which had to be solved and of the difficulties which had to be overcome before speech became possible over cable routes having a length of several thousand miles.

Underground cables are, when the number of lines is few, say, 20 or less, more expensive to install than overhead lines, or cable suspended from steel wires, but, as their " life " is at least three times as long as the others and their service infinitely more reliable, they are really an economical investment from the beginning.

When the number of circuits exceeds 20 there is no question of the superiority of underground cables even in first cost, and so the underground cable is being employed

Fig. 2.—Broken Overhead-wire Pole Line.

on all the recent schemes for extending the European network of trunk lines.

The first difficulties encountered in replacing open

lines by cables were the greater attenuation and distortion of speech. The best results were obtained with conductors insulated with untreated paper so as to form air spaces. Even so the dielectric losses in the insulating medium increased the attenuation at the average frequency of speech by 300 per cent. as compared with open lines. These losses increased with the frequency, thus the attenuation was doubled when the frequency increased from 500 to 1,900 p.p.s. so that speech transmitted through cables sounded unnaturally deep and many consonants were so distorted that it was difficult to understand the words.

In the year 1886 Heaviside had suggested that this undesirable effect of the mutual capacity in cables could be reduced by increasing the inductance (" Electro-magnetic Theory," Vol. I). Krarup carried this out by winding a continuous iron wire around the line conductor, but a better and cheaper method was found by inserting inductance coils (called loading coils) at regular intervals along the line. In 1899 Pupin took out a patent wherein he claimed that, by the insertion of induction coils at such regular intervals, the distance between the coils is rendered short as compared with the length of the waves at the frequencies to be transmitted (U.S.A. patent 652,230 of December, 1899). To meet this requirement the distance between the coils has to be between one and two miles. In England a length of 2,000 yards has been universally adopted. In Germany the standard spacing is 2 km. Fig. 3 shows a group of cast-iron cases each containing loading coils ready for joining into an underground cable. Loading the line with self-induction and using thinner

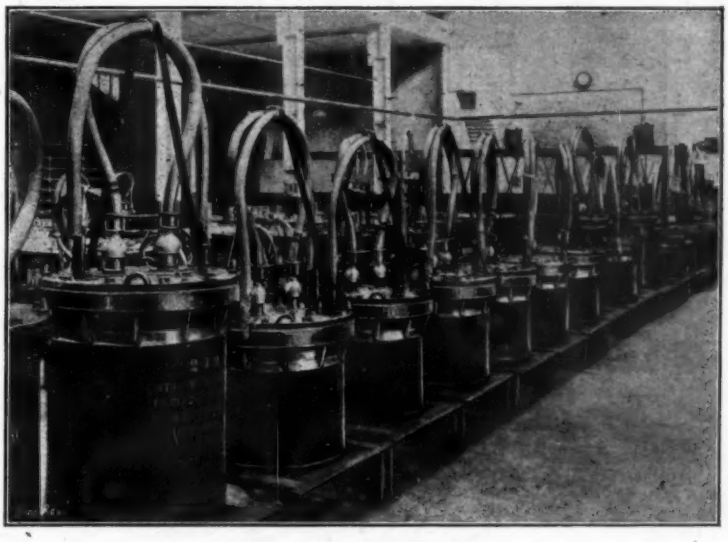


Fig. 3.—Loading-coil Pots.

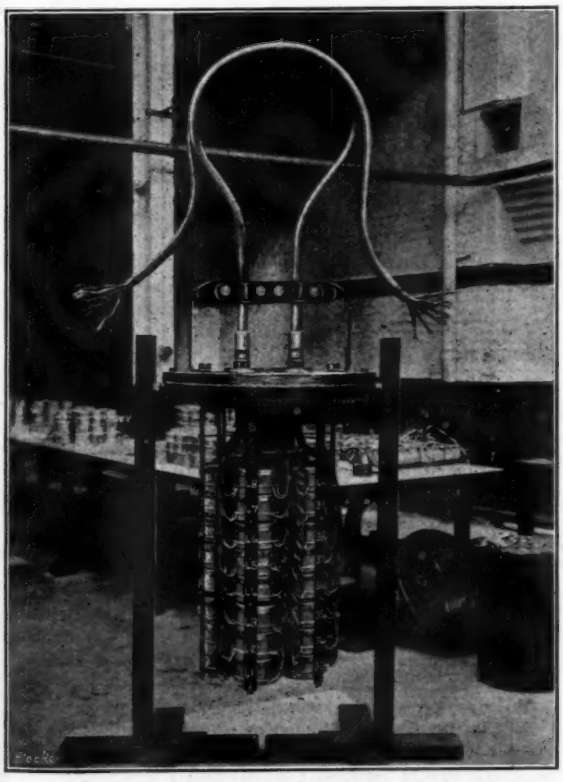


Fig. 4a.—Loading Coils being Joined Up.

conductors enables the same amount of energy to be transmitted at a higher potential with a lower current; thus reducing the chief source of loss, namely, ohmic resistance.

In actual practice the attenuation in a cable circuit can be reduced to about a third of its original value by the insertion of loading coils; but the distance over which speech can be transmitted is more than trebled, because the loading of the cable at the same time reduces the distortion, so that the words transmitted are better understood. As the distance between the loading coils is small, compared with the length of the waves, it can be assumed for calculation purposes that the mutual capacity of a section between two coils is concentrated at one point. Thus a loaded line can be represented by an equivalent network based on the theory that has been widely published by Prof. K. W. Wagner (" Archiv fur Elektrotechnik," Vol. III, page 315; Vol. VIII, page 61), and by Campbell (U.S.A. patent 1,227,114 of 15/7/1915).

It is well known that such a line, assumed to have no loss, will pass without attenuation all frequencies below that of the resonance frequency of its members; but such a line chokes out all frequencies having a higher value. This resonant frequency, called the cut-off frequency (f_0), is defined by the well-known equation $f_0 = 1/\pi\sqrt{LC}$, where L is the total inductance (in our case that of the loading coil) and C is the total capacity, which here is the mutual capacity of the loaded section. Due to the

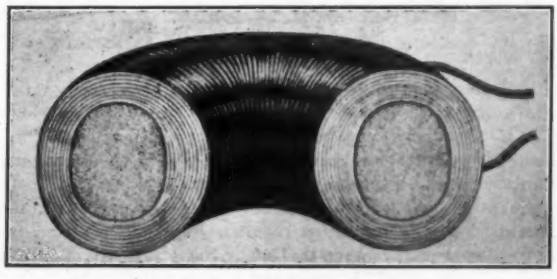


Fig. 4.—Loading-coil Section.

resistance and leakage the attenuation curve begins to rise as the cut-off frequency is approached, and so the cut-off frequency must be kept sufficiently far above the frequencies to be transmitted. Reducing the inductance of the coils increases the cut-off frequency and thus improves the quality of the speech transmission, but also increases the attenuation; and so if a certain attenuation value is specified it is necessary either to reduce the distance between coils or to increase the cross section of the conductor; either method increases the cost and so for the sake of economy it is necessary to effect a compromise. This will be discussed later.

At the most important speech frequencies, providing the cut-off frequency is sufficiently high, the coil loaded line behaves like a homogeneous line. It would also be free from distortion if the relationship between resistance

and inductance were the same as that between the leakage and the capacity. This is not so, the figure being leakage/capacity 15 to 20 for air and paper insulated cables, while the resistance/inductance generally is 30,000 to 100,000 for unloaded cables and 200 to 600 for loaded cables. It will be seen that the relationship is very much improved when the cable is loaded and so also the speech is much less distorted.

The first loading coils were made without any magnetic core and were therefore rather large, but in England a fair quantity of them was installed and did good service.

The next advance was to use iron wire of small gauge and then later nickel-iron wire or tape. Coils of this type are still found in use. They are economical in space and price, but have the disadvantage that they may be permanently damaged by the passage of a direct current of a tenth or a fifth of an ampere, and also the direct current. This feature is particularly important for loading coils installed alongside electric railways or other power lines.

Short circuits occurring in the railway lines, in conjunction with earth faults in neighbouring communication lines, may in many cases give rise to induced currents of values as high as two amperes in the telephone line. Such induced currents would not perceptibly alter the inductance of the latest type coils with pulverised-iron core, whereas the iron wire or tape core coils would be altered 15 per cent. to 20 per cent., a variation which, of course, plays havoc with the attenuation curve and completely upsets the established characteristics of the line. Later on we shall further consider the importance of this stability or freedom from magnetisation.

Whilst planning the interurban cable routes in their own territories, the telephone authorities of the various

Fig. 5.—European Long-distance Cable Network.

hysteresis and eddy current losses rise with the frequency and, of course, increase the distortion of speech.

Some few years ago a further great advance was made in this connection. As a result of experiments and research work which were started in 1901, Messrs. Siemens and Halske, in 1923, perfected a core which consisted of extremely fine iron powder, compressed into a solid block and having each particle covered with a very thin skin of insulation. Fig. 4 shows a cross section of a coil with such a core. A somewhat similar core, but made in laminations, was produced and introduced into telephone cable lines in America by the Western Electric Co. Fig. 4a shows a batch of similar coils being connected up for insertion in a cast-iron case before being joined into a telephone cable.

By using these dust-iron cores it has been possible to make the effective resistance of the coils less than that in the former wire-cored coils of similar size and the great subdivision of the core material has furthermore greatly reduced the iron losses, which varied with the frequency and gave rise to distortion of speech. The chief advantage, however, of pulverised- or dust-iron-core coils is their "stability" or freedom from magnetisation by

countries have kept in mind the creation of a good international European cable network and to this end a special committee (Comité Consultatif International des Communications Telephoniques à Grande Distance) consisting of the leading engineers from each telephone organisation, has been created and has been holding annual conferences since 1925 in Paris and elsewhere.

Fig. 5 shows the layout for the most important European telephone routes as given in the scheme proposed by Dr. Craemar, until a short time ago one of the leading engineers of the German State Telephone Administration (Das Fernkabel Tome, September 4th, 1923, Das Europaische Fernkabelnetz).

As in many other matters, the British Post Office did much pioneer work in the use of underground cables and as far back as 1899 had installed combined telephone and telegraph cables between London and Birmingham (112 miles) and Manchester and Bolton (11 miles). When first laid these cables were not loaded, but loading was added during 1902 and later.

The first purely telephone underground cable of any size in Europe was that which was laid by the G.P.O. between Manchester and Liverpool (36 miles) in 1910. It

had 208 conductors each of 70 lb., that is, .066 in. diameter (1.676 mm.) and was loaded.

The next step in improving communication by underground cable came with the balancing of cables, and the first of this new type was the Leeds-Hull cable, laid in 1912-13. It was 50 miles long and had 96 conductors 70 lb. (.066 in. 1.676 mm.) and 12 conductors 100 lb. (.079 in. 2.009 mm.), and was laid more or less as an experiment (see Pollock I.P.O.E. *Journal*, Vol. VII, Parts 1 and 4). It was so successful that it was quickly followed by the first long-distance cable, London-Birmingham-Liverpool (198 miles), and this was laid in 1913-1914 and was balanced and loaded, and consisted of 48 conductors 100 lb. (.079 in. 2.009 mm.), 24 conductors 150 lb. (.097 in. 2.461 mm.), 28 conductors 200 lb. (.112 in. 2.841 mm.), and 4 conductors 300 lb. (.137 in. 3.48 mm.).

In the year 1911 the German Post Office gave Messrs. Siemens & Halske an order for constructing the 600-km. (350 miles) Rhineland cable between Berlin and the centre of the Rhine district, thereby taking the first step in creating a Continental underground trunk telephone cable network. The section between Berlin and Hanover was taken into service in 1914, but the war delayed the completion of the entire route until the year 1921.

Telephone engineers in all countries will remember the significance of this first Continental underground cable, though nowadays one can easily construct cables which are technically far superior to it. In that cable it was necessary to use conductors having a diameter of 3 mm., in order to be sure of transmitting speech sufficiently loudly over the whole circuit, *i.e.*, the underground cable and the subscribers' lines at each end. The size of the wire really determined the maximum length of the cable, because many difficulties arise in the construction and installation of cables with conductors of a larger diameter.

The next advance came with the introduction of the valve amplifier or repeater, rendered possible by the invention of the valve in 1904 by Fleming and developed later by De Forest in 1906. Although the valve was invented in 1904 it only came into use in connection with telephony during the war period.

The valve, which is similar in all intents and purposes to those used by all classes of people in wireless sets, enables the speech current, which has become attenuated in its progress along the line, to be amplified to a suitable strength and so passed into the next repeater section; and these repeater sections can theoretically be multiplied indefinitely. As a result of this possible amplification of the voice currents a very thin copper conductor can now be used for the cable construction.

The British Post Office began to use repeaters for the purpose in 1919 and 1920—when the London-Manchester (200 miles), London-Bristol (120 miles), and London-Southampton (80 miles) cables were installed. The Manchester cable had 160 pairs of 40 lb. conductors (.050 in. or 1.27 mm.) and the others were made with 20 lb. (.035 in.) wire (.898 mm.).

By using repeaters in conjunction with a loaded telephone cable, it is possible now to speak over any length of route likely to be met with in Europe.

In fact in some recent experiments at Wiedenbruck the experts of the Third Commission of the Comité Consultatif International des Communications Telephoniques à Grande Distance, listened to good quality speech which was transmitted over lines 11,000 km. (6,800 miles) long.

(To be continued.)

Trade Unions in Conflict.

A Review of the Circumstances in a recent Legal Action.

By J. W. THOMAS, LL.B., B.Sc., A.M.I.E.E.

MANY interesting points affecting the organisation of the employés and the composition of the Whitley Councils in the electricity supply industry emerged during the course of the trial of the recent action for libel which was brought by the Electricity Supply Workers' National Association and its general secretary, Mr. G. Gorton, against three officials of the National Union of General and Municipal Workers, Messrs. C. Dukes, M.P., J. T. Watkins, and J. H. Hampson. The result of the action has already been briefly reported in these columns, on June 20th, so it is not necessary to cover the ground again except in broad outline.

It is worth noticing in the first place that the action was brought by a trade union and its general secretary against the three defendants in person and not against their trade union, notwithstanding the fact that the circular containing the libel had been issued by them in their capacity as officials. The reason for this was that whilst a trade union may sue for damages on account of a wrong done to it, an action cannot be brought against it but only against its officials.

The alleged libel was contained in a circular letter signed by the three defendants and circulated by them to the representatives of their union in the various undertakings in the area of No. 3 (North Western) District Council. It alleged, among other things, that the plaintiff, Mr. Gorton, had decried the value of Whitley Councils whilst at the same time he was endeavouring to secure representation upon them. It stated also that the employers' side of the District Council had decided not to recognise or engage in any negotiations with Mr. Gorton so long as his Association was not represented on the Council and went on to assert that "any worker in the industry who becomes a member of the Union in question . . . . in effect cuts himself off from the benefits and protection which for many years have been enjoyed by reason of the operations of the Industrial Council, or, in other words, he deprives himself of the means by which any grievance might be ventilated and remedied." It concluded by expressing the hope that the workers would "put an end once and for all to a movement which has been disruptive in the past and certainly not to the best interests of the workers in the electricity supply industry." According to the plaintiffs this circular was defamatory, inasmuch as it contained what was tantamount to an accusation that Mr. Gorton was not acting straight, and it was calculated to do harm to the union because it implied that it was not a genuine trade union but was a disruptive movement in the industry.

During the course of the hearing considerable light was thrown on the events which had preceded the publication of this circular, and it was clear that there had been a constant struggle going on for the past eight years between the Electricity Supply Workers' National Association and the other trade unions in the supply industry. The evidence showed that there was not only a considerable amount of disorganisation as far as the employés were concerned, but also that friction was being generated owing to the overlapping of the various unions. In 1921, when the plaintiff's union came into being, there was a comparatively large number of unions catering for the various employés in the electricity supply industry, amongst them being the Electrical Trade Union, the National Union of General Workers, the Municipal Employés' Association, the Enginemen's and Firemen's Union, the Amalgamated Engineering

Union, &c. The bulk of the membership of practically all these unions was outside the electricity supply industry; in fact, in the case of some of them the supply workers formed a very small minority of the total membership. As a general rule there was no special provision or special section whereby the supply workers could make their peculiar needs articulate, and thus a grave danger existed of the minority being somewhat neglected and certainly out-voted by the majority outside. It was no uncommon thing for employés to change over from one union to another if they were likely to benefit by it, and in short there was a general dissipation of strength. There was also a feeling amongst many employés that their interests would be better looked after if they were organised in one union instead of in several. According to the evidence, the plaintiff union had its origin amongst some employés in the Lancashire area who were of this opinion and at the time felt a grievance against the union to which they belonged. They decided to form a new union to cater exclusively for employés engaged in the supply industry and officered by men who were familiar with their needs. They apparently felt that a compact union would be able to negotiate more effectively with the employers and would be less likely to be subject to disturbance if it had no connection with outside industries. They were not unaware that endeavours had occasionally been made to involve the supply industry in disputes which had their origin outside, and that in fact the threat to shut down electricity undertakings had occasionally been employed in order to force the hands of employers in other industries.

That a strong desire did exist for such a separate union is evidenced by the fact that when the Electricity Supply Workers' National Association was formed it developed rapidly, especially in the north. The course of development in the supply industry during the last few years, so far as the organisation of the employés is concerned, has been towards the reduction in the number of unions. This has been accomplished by means of amalgamation, but even to-day there are undoubtedly too many unions covering the same field. The object of the plaintiff union was to take a short cut and endeavour to build up a new union instead of waiting until the existing ones had combined together. The difficulty, however, which the new union had to encounter was with regard to representation on the Industrial Councils and it was in this connection that the old established unions were able to oppose the newcomer. It is well known, of course, that the District and National Joint Industrial Councils consist of an equal number of employer representatives and employé representatives. The latter are chosen by the trade unions but there is nothing in the constitution of the Councils which lays down the method whereby the representatives are to be selected. Thus the unions that are represented on the Council are in a position to determine whether a new union shall be given a seat on the Council or not.

The Judge not unnaturally said that this was undesirable as they were likely to be biased in their own favour and would be tempted to exclude a rival union. This is just what happened when Mr. Gorton applied in 1924 for a seat on the No. 3 District Council. The trade union representatives opposed him on the grounds that his union had violated the unwritten rules of trade unionism by " poaching " their members and because, in their view, it was not a genuine trade union. Even when Mr. Gorton was able to prove that in the No. 3 Area he had as many as 800 employés in his union, as compared with approximately a total of 3,000 in other trade unions, they still resisted his claims. He therefore appealed to the employers, and they were so impressed by the figures that they referred them to the trade unions for refutation or otherwise. Apparently the trade union side did not attempt to refute them and one can only assume that they found them incontestable. Matters dragged on for several months until the final climax was reached in 1928, when it came to the knowledge of certain of the trade union representatives on the employés' side that some of the members of Mr. Gorton's union had come into possession before their own members of a schedule which had been agreed upon by the District Council. The trade union side forwarded a protest to the employers and this was followed by a meeting of the executive of the District Council at which a recommendation was made that representation of Mr. Gorton's union on the District Council should not be conceded. At the meeting of the full Council the chairman of the employers' side stated that the employers had decided not to recognise Mr. Gorton's union so long as it was not represented on the District Council. Thus a complete *impasse* was reached from which there appeared to be no possible means of extrication. The trade unions naturally felt they had won in the long struggle as, they had been successful in preventing the plaintiff union from enjoying the benefits of the Whitley Council machinery.

It should be borne in mind, of course, that whilst Mr. Gorton and his union obtained judgment in their favour so far as the circular was concerned, the trial did not solve the problem of representation on the Whitley Councils. The *impasse* still remains, with the difference that Mr. Gorton and his union have been able to ventilate their grievance in a much wider sphere. But it is obviously unfair that a union which has grown up in order to satisfy a genuine demand should be denied representation on the Whitley Councils, and it rather looks as if some alteration should be made in the constitution so as to provide that representation of the employés in the industry should be upon the basis of membership and that no registered trade union which can claim the proper proportion of members should be excluded. It hardly seems just to the employés themselves that they should be refused a voice because they are not in the existing unions, nor is it fair to the employers that a considerable portion of the employés should be in a position to repudiate the decisions of the Whitley Councils because they are not parties to them.

The resolution of the employers' side of No. 3 Board, to the effect that they would not recognise Mr. Gorton's union as long as it was not represented on the Council, was interpreted by the defendants as meaning that the undertakers in the area would not recognise Mr. Gorton's union, but the more reasonable explanation according to the Judge appeared to be that it only meant the employers' side of the District Council. One can hardly think that the interpretation of the defendants is the correct one, otherwise it might have exposed the undertakings to considerable criticism for making a distinction between trade unions.

Some very interesting passages took place between the Counsel for the plaintiff and the defendants with regard to what constituted a genuine *bonâ fide* trade union and the answers of the defendants were not altogether satisfactory. They admitted that the plaintiff union was registered, and that its rules were very similar to those of other trade unions. The only reason that was finally elicited as to why it was not in their opinion a genuine trade union was that it " poached " on other trade unions. They themselves, however, were at last forced to admit that allegations of " poaching " were common amongst " genuine " trade unions. One must still await, therefore, an authoritative ruling on the question, and for the time being be content with the view that a trade union is not genuine or *bonâ fide* until it has become powerful enough to secure a footing for itself in an industry. It is common knowledge that the charge of being a bogus union has frequently been levelled against new unions, *e.g.*, the Electrical Power Engineers' Association, notwithstanding their registration, solely because they have grown up against the opposition of unions who imagine they ought to cover the ground themselves. It is not until they have established themselves that the accusation ceases to be levelled. It is worth noting that the Judge in his summing-up stated that it would constitute grounds for an action if a person described a trade union as not being *bonâ fide*, as such an assertion might injure it.

The E.A.W. Conference.

A report of the proceedings and social functions of the fourth annual conference at Newcastle.

THE worst thing about the North-East Coast is its climate, and the most flattering description of the climate is that it is austere. Nevertheless, if grey skies are to any degree responsible for the resiliency of spirit that will not be broken by adversity, then there is much to respect, if not to like, in the climate. Yet we are ungrateful; for, on the present occasion, the weather was summerlike and a pleasant breeze tempered the sun's warmth.

The proceedings opened on Wednesday, July 11th, at 7 p.m., with the issuing of badges at the Oxford Galleries, followed by an informal reception by the officers of the North-East Coast branch of the E.A.W. The opening ceremony took place on Thursday morning at the Festival Hall in the Exhibition grounds, and was presided over by Mrs. Wilfrid Ashley (president). Welcome to the delegates was given by the Lady Mayoress (Mrs. Arthur W. Lambert) on behalf of the "canny toon" and by Miss Baxter Ellis on behalf of the Exhibition authorities.

Fig. 1.—Group of Members at Lemington Glass Works.

Fig. 2.—Mr. Rosen and Mr. Pike at the Encampment.

Fig. 3.—Miss Ridley, Mrs. Christie, Mrs. Ll. B. Atkinson, Mr. Ferry and Mr. Barras.

The expression an "opening ceremony" probably does not convey great promise of an interesting event. Actually the speeches were full of point, while the contribution of the foreign delegates took the form of addresses on electrical work in their several countries. A summary of the speeches and an abstract of the papers—by courtesy of their authors—are given below.

The high quality of these papers apparently came as a surprise (one may as well be quite frank about it) to many of the men present, who were possibly more inclined to take for granted the admirable organising ability manifest throughout the conference. In passing, it may be observed that the legible notice on the platform giving the name of each speaker as she or he arose, proved a boon to the audience. Another surprise was the clear and fluent English spoken by the Continental visitors. This surprise is recurrent at every international convention, when so many foreigners, chosen not for linguistic ability but for technical attainments, are found to possess the gift of tongues; whereas a similar gift, as was recently so happily displayed by the President of the I.E.E., is noteworthy among Britons.

After the meeting a group photograph, reproduced herewith, was taken. For the other photographs included in this account we are indebted to the kindness of Mrs. Llewellyn B. Atkinson.

Lunch followed at the Grand Assembly Rooms, Barras Bridge. This was attended by the Lord Mayor and Lady Mayoress (Councillor and Mrs. Arthur W. Lambert), the Sheriff of Newcastle and Mrs. Allan, and many other well-known people. The speeches, a summary of which will be given later, were again full of interest.

Fig. 4.—Members of the E.A.W. outside the Festival Hall.

The afternoon was spent at the Exhibition, the opening of which was described in the ELECTRICAL REVIEW of May 17th, p. 891, and May 24th, pp. 904 and 940. Further particulars are given elsewhere in this issue. In view of the part played by electricity in stall lighting, sign illumination, and motive power, almost

the whole exhibition may be described as electrical. During the afternoon the famous Black Dike band provided music for all tastes, from Wagner to jazz. The kind invitation of the Women's Committee to take tea at the Garden Club was much appreciated.

The opening day of the Conference ended very happily with a reception and dance in the Grand Assembly Rooms, given by the City and attended not only by the E.A.W. delegates but also by the Mayor and other representative citizens of Arras, the town adopted by Newcastle, and by members of the British Legion. The guests were received by the Lord Mayor and Lady Mayoress, and the Sheriff and Mrs. Allan.

As an interlude to ball-room dancing, a display of folk dancing was kindly given by workers in the Lord Mayor's summer camp for children. The Lord Mayor, after proving his skill as a conductor of community singing, showed himself the possessor of a pleasing baritone voice in a rendering of "Northumberland," written and composed, we gathered, by his accompanist, the Lady Mayoress. The men of Arras gave us "Matelôt" and the always moving "Marseillaise," and as a return heard how Novocastrians can sing "Scotswood Races."

On Friday morning, June 12th, the annual general meeting of the Association, held at the Exhibition, was presided over by Mrs. Hammer, chairman of the E.A.W. Council, and the annual report was presented by the director, Miss C. Haslett.

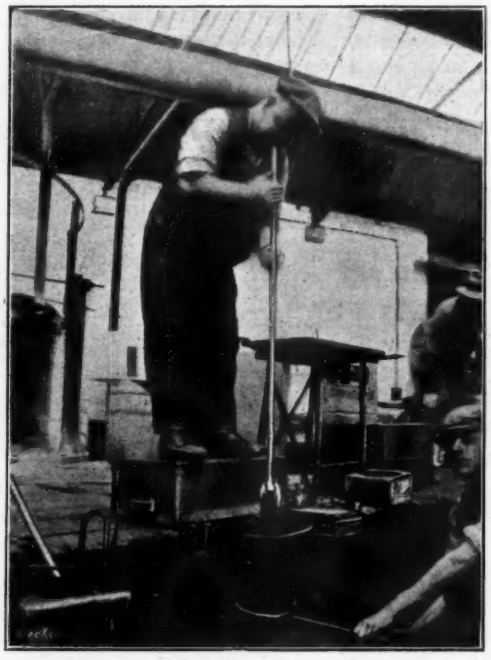


Fig. 5.—A Glass-blower at Lemington Works.

Fig. 6.—Miss Anna Holm at the Roman Wall.

Mrs. Wilfrid Ashley was unanimously re-elected president, and the other officers elected were:—Mrs. S. Z. de Ferranti and Mrs. Hammer, joint chairmen; Councillor Mrs. Gregory, vice-chairman; and Mrs. Ll. B. Atkinson, hon. treasurer.

At the conclusion of the meeting a very good discussion took place on the papers which had been read on the previous morning.

Immediately after lunch, the delegates divided into four parties and visits were paid to the Lemington Glass Works (General Electric Co., Ltd.); Cremona Park Toffee Works, by invitation of A. S. Wilkin, Esq.; A. Reyrolle & Co., Ltd. (for a description of Reyrolle's works readers may be referred to the *Electrical Age* for June, 1929); and to Seghill Colliery, by invitation of Captain S. Walton Brown and directors.

All the visits were of more than usual interest, and were very much enjoyed, and everywhere members received generous hospitality.

On Friday evening delegates were entertained to an excellent dinner by the North-East Coast Branch of the E.A.W., and were received by Miss Balls, chairman, and the vice-presidents, Miss Sloan, Mrs. Norbert Merz and Miss Teresa Merz.

Miss Balls presided, and once again the gathering was distinguished by the presence of the Lord Mayor and Lady Mayoress and the Sheriff and Mrs. Allan.

The speeches, too, were excellent. The toast "The Lord Mayor and Corporation," proposed by Miss C. Haslett and responded to by the Lord Mayor and the Sheriff; "The Local Association," proposed by Mrs. Hammer and responded to by Miss Balls; "The Overseas Visitors," proposed by Mrs. Norbert Merz and responded to by Mrs. Van Waveren. In a witty speech, Mr. E. E. Sharp responded to the toast of "Guests and Men," amusingly proposed by Miss Cooper Hodgson, C.B.E.

The great interest which the Lord Mayor and Lady Mayoress took in the Association, and the fact that they attended all the social functions, added considerably to the pleasure of the Conference.

A delightful programme was arranged for the delegates who remained in Newcastle over the week-end. On Saturday afternoon they were taken in private cars to Borcovicus, one of the finest Roman encampments in this country, and on Sunday were privileged to visit and land on the Farne Islands, a unique experience which no one can ever forget, and for which thanks are due to Mr. Sloan and the Newcastle-upon-Tyne Electric Supply Co.

The detailed arrangements of the Conference locally were very ably carried out by Miss Anna Holm, the branch honorary secretary and her Committee, assisted by prominent engineers on the North-East Coast.

Opening Ceremony.

After expressions of welcome from the Lady Mayoress and Miss Baxter Ellis, the president (Mrs. Wilfrid Ashley) thanked the N.E. Coast branch of the E.A.W., the Lord Mayor and the Exhibition authorities, and said that the E.A.W. was the first non-commercial organisation of its kind in the world. She hoped the organisation might in time become international. The first aim of the Association was to educate women in the uses of electricity, and it was carrying out an important campaign for teaching electricity in schools. The Board of Education had recently received a deputation on the subject. The second aim was to express the women's point of view in matters electrical, such as in the campaign for the better wiring of homes. Just as men had introduced science and up-to-date tools in the workshop, so should women introduce them into the home

Miss S. Malicki (National Electric Light Association, U.S.A.) said that, during the 50 years since the invention of the electric lamp, electricity had been brought to 62 per cent. of the 28 million American homes (82 per cent. of the urban homes), but housework was not completely mechanised in all of these. The cost of electricity was almost negligible—about 1 per cent. of household expenditure—and averaged £5 10s. per annum as against £84 for automobiles, £20 for tobacco, and £9 10s. for candy. Electricity cost 25 per cent. less than before the war, while other household costs had increased by 70 per cent. Electrical appliances could always be obtained by deferred payments. Instructions on the use of appliances were given in the consumers' homes.

The Women's Committee—some 30,000 in number—included

women of most of the electric supply companies in the U.S.A. and Canada, and afforded education in the relation of utility companies to the public. It published articles on the uses of electricity in the home. Homemakers were invited to the meetings, where they they came to know the company personnel and policies. The result had been a higher type of woman representing the industry.

Women were found in most executive places, especially in advertising, publicity and selling, but there was no conflict for places held by men. Electricity was in use on 500,000 farms.

Electric power could now be taken to the source of raw materials, with the result that small towns were becoming thriving industrial communities, resulting in a more even distribution of wealth throughout the country. Miss Malicki also referred to the fact that both Mr. Samuel Insull and Mr. Martin Insull, heads of one of the greatest electrical organisations in the United States, came from England.

Miss HELEN NORRIS (Dean of Women in the Commonwealth Edison Company of Chicago) said that her company had over 11,000 employés, of whom 1,132 were women, who all came under her supervision. (The proportion of women to the total was very similar to that of the Newcastle-upon-Tyne Co.). About 100 were employed in the electric shops, selling appliances; 50 as waitresses or assisting in the staff kitchens. College trained women were engaged as librarians, lunch-room supervisors, home lighting specialists, a physician, and trained nurses. The supply counter of the electric shop was also supervised by a woman. The remainder were employed on correspondence, accounts, telephone operation, &c. All were eligible to follow the programme of the National Women's Committee described by Miss Malicki. They met once a week from September to June to hear a speaker either from the industry or from outside. They had classes in the prone pressure method of resuscitation, public speaking, and also programmes provided by the members. The company encouraged athletics. With other associated interests the company owned a large vacation camp, about 90 miles from Chicago on a lake in Wisconsin. There were a hotel, 200 cottages, a camping ground, an orchestra and boating and swimming. The Women's Division consisted of members employed in all branches of the industry to do a similar work to that of the E.A.W.

The Right Hon. MARGARET BONDFIELD, J.P., M.P., who has long taken a great interest in the Association, had hoped to be present. Parliamentary duties, however, kept her in London, and the following letter from Miss Bondfield was read by Dr. S. Z. de Ferranti, F.R.S. :—

"When you consider how much time the average woman spends on tasks which, however useful and necessary, are in essence merely drudgery, it is obvious that a very great step forward could be taken towards a fuller and richer existence if science could be applied to domestic work as it is to industry.

"Electricity, it seems to me, is precisely the key that will one day unlock this door, and it is of first importance that the ranks of those who are putting forward new schemes should include a fair proportion of keen women. It is equally important that women in the home should be stirred up to demand new schemes."

Dr. FERRANTI endorsed Miss Bondfield's remarks, recalling similar views expressed in his presidential address to the I.E.E. in 1910. Houses as factories are more numerous and more important than all other factories put together. Women should not imagine that only men were naturally mechanics, as considerable mechanical aptitude was required for cutting out a dress. Women's mechanical experience must now be supplemented by electrical knowledge.

A vote of thanks to the overseas speakers was proposed by Lady Moir, O.B.E., a vice-president of the Association and president of the Women's Engineering Society, and seconded by Bailie Mrs. Bell, of Glasgow.

Electrical Accidents and Their Prevention in Households.

By Miss K. BOHM, Diplom. Eng.

(*Abstract.*)

The supposition still exists in Germany that electricity is too costly for the masses. The electric vacuum cleaner and other small appliances are extensively used, but the question has not yet been solved everywhere whether the kitchen and laundry should be electrified. In Germany there is a very real war between electricity and gas. Romestadt, the new suburb of Frankfort, is entirely electrified. Water is heated by night on the thermal storage system. A combined electric and coal stove is used for cooking.

In the new suburb to Berlin houses for 2,500 families are being built. The cooking and laundry equipment will be entirely electric, but room-heating and water heating are to be obtained from waste heat from the local power station. The cost of electricity will be about ½d. per kWh.

The electrical industry is planning a course of training for women as demonstractors and lecturers, with a view to their acting as interpreters between the engineer and the housewife. Many women have a deeply-rooted idea that electricity is dangerous, but this is, of course, due to lack of knowledge. Danger is either due to carelessness and ignorance in handling or to defective installation. Only apparatus of the highest quality should be used and proper attention should be given to its handling. Special precautions should be taken in damp places, such as bathrooms, cellars and kitchens, where all metal, not carrying current, must be carefully earthed. Switches and plugs should be so arranged as to avoid possibility of their being touched simultaneously with a water-pipe. Automatic temperature regulation is a protection against fire, and may be applied to every electrical appliance with success. Fires due to short-circuits are generally caused by the replacing of fuses by hair-pins and other unsuitable wires. The essential points in the use of electricity should be taught in schools.

The Progress of Electricity in Holland (with particular reference to Rural Areas).

By Mrs. E. J. VAN WAVEREN.

(*Abstract.*)

In the existing eleven provinces of Holland, with one exception, the provincial authorities are authorised to supply electricity. The exception is South-Holland, where the municipal undertakings of Rotterdam, The Hague, Dorchecht, Delft, Leiden, and Gouda have extended their networks so as to cover the whole area of the province.

The provincial electricity undertakings make no profit, any surplus being used to bring electricity within the reach of the entire population and to establish the same low cost in the countryside as in towns.

When studying rural electrification we must take into consideration the difference in mentality between the rural population and the town-dwellers. The country-dwellers live most plainly and still consider the benefits to be derived from electricity as a luxury, in which they must not indulge. It is the thrift of the Dutch farmer that stands in the way of the development of rural electrification. The villager does not know gas, while coal and coke are expensive owing to the high cost of transport. For cooking and heating, peat, wood, and paraffin are used. Lighting is by paraffin. The women are expected to assist in the fields or at the farm after their household drudgery.

In Holland we have no land-owners living on large estates amidst their tenants, but only big and small privately-owned or rented farms lying wide apart. When the electrification of a rural district is started, attention is first paid to the provision of good drinking water, in place of the insanitary wells, and this can be obtained only by deep boring. A small electrically-driven pump will do the work and requires little maintenance. The water is accumulated in a reservoir and conducted by pipes to the different premises.

People living in villages which have not a supply of electricity are so anxious to enjoy its benefits that many of those who carry on small home trades actually move and settle down in villages where current is available. Where electricity is applied to agriculture, women's help is no longer required in the fields.

In Holland rural electrification owes most of its progress to the applications of electricity in the home, which are appreciated even more than electric light. This progress has not been accomplished without effort. The domestic advantages of electricity must be brought home to the housewife, and a sustained educational campaign is necessary for success. The country woman will not go to the showroom of the undertaking; it is too grand for her. She must be visited in her own home. In Gelderland, propaganda agents go on bicycles from house to house of the 70,000 consumers carrying apparatus for demonstration. These men are authorised also to examine the installations free of cost. Any repairs needed are reported and carried out within a day or two. Apparatus ordered is delivered the next day from the provincial showroom, and a technical agent is sent to see that the wiring is adequate and to instruct the housewife as to how she can save time, labour and money. The meter-reader each month inquires whether there is any cause for complaint and whether the appliances are used regularly; regular use is considered of more importance than numerous sales. Agents are instructed never to lead consumers to expect more from the use of electrical appliances than is likely to be realised.

The undertaking also readily sells apparatus not exceeding 15s. in price at the weekly markets. Housewives can get a cooking range on trial for six months, and agents teach them in their own homes how to cook with an economical consumption. The special price of energy for cooking is 0.8d. per kWh, and 25 ranges are sold per month. When ranges were sold without such instruction, they were mostly given up after six months' use, either because they got out of order or because they used too much energy. A dissatisfied housewife can do more harm to electrical development than twenty who are satisfied, but never say so.

Without adequate service, propaganda and the sale of the best appliances would be no good, and for this reason the Gelderland provincial undertaking has taken up the sale of appliances.

The cost of providing six lighting points and one power outlet is borne by the undertaking, and household appliances above 15s. in value are supplied on easy hire-purchase terms. When the inhabitants of a rural district have, after a few years, become accustomed to the use and care of appliances, a small district shop is opened for sales and repairs. It has been demonstrated that the consumption of twenty-eight workmen's cottages is equal to that of one large villa, but that the maximum demand is only one-third. The undertaking of Gelderland has become a paying business, although the area is agricultural, with only a few big towns and industries.

(*To be concluded.*)

D

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures.

The Factory Lighting Campaign.

The British Electrical Development Association has published a report upon the Factory and Workshop Lighting Campaign, which took place from September to November last year. The introduction to the report recapitulates the reasons for the campaign, its objects, the methods of financing it, the organisation and personnel, the general plan of campaign, local organisation and the literature specially produced for the use of the electrical trade. A summary of the work carried out in connection with the campaign shows that 96 towns co-operated in the organisation of campaign lectures; 72 addresses were given to the electrical trade; and 120 lecture-demonstrations were given to industrialists, the attendances ranging from 30 to 350 and the total reaching 5,931. The lectures were given in a variety of halls, factories, &c. In one area one of the largest manufacturing firms placed its workshops at the disposal of the Area Committee for lecture-demonstration purposes; some 350 industrial consumers attended one of the lectures held in these works. The report gives particulars of the direct mail publicity carried out, and some details of advertising to the trades of the country. The results of the campaign cannot, of course, be gauged with any real degree of accuracy, but it is stated that 2,400 of the 100,000 factories and workshops approached asked for further information, and many letters of appreciation were received. It is confidently stated that one result will be that the subject of industrial lighting will remain "alive" for a number of years. Letters received indicate that the campaign has placed a considerable amount of work in the hands of the installation trade, and it has provided a practical illustration of the value of co-operative organisation. There remains from the funds provided a balance of about a thousand pounds. It has been decided to expend this in some useful "follow-up" work for the benefit of the electrical industry. In their conclusions, Lt.-Col. W. A. Vignoles, the campaign chairman, and Mr. J. L. H. Cooper, the secretary, consider that the campaign has done much towards the achievement of its objects: to inculcate the elementary principles of correct lighting and thus create a market for the sale of installations and equipment.

Church Lighting.

A well-illustrated brochure upon the lighting of churches has been issued by the GENERAL ELECTRIC CO., LTD. This shows in an excellent manner the treatment of various forms of architecture and construction, each building requiring special attention. The views of actual installations designed by the company's illuminating engineers, and employing the company's equipment, illustrate the great advance which has been made in this direction in the last few years. At the end of the brochure types of fittings produced by the company are depicted.

Large American Electrical Merger.

The recently-announced merger of three important utility companies in Upper New York State—the Buffalo, Niagara, and Eastern Power Corporation, the North-Eastern Power Corporation, and the Mohawk and Hudson Power Corporation—has a capital of $450,000,000, according to its charter which was filed on July 16th. The new company is called the Niagara Hudson Power Co.—*Reuter* (Albany, N.Y.).

New Great Yarmouth Showrooms.

The new offices and showrooms just opened by the Great Yarmouth Corporation Electricity Department provide an excellent example of what such premises should be. The exterior, as will be observed from fig. 1, is handsome and imposing, forming a worthy addition to the buildings of the town. The nature of the interior arrangements can be judged from fig. 2, which illustrates the entrance hall. The panelling and decoration are very tastefully carried out. Opening out of this entrance hall are five rooms furnished as the rooms of a house and electrically equipped for their particular purposes. They comprise a drawing room, bathroom, kitchen, bedroom, and dining room. A sixth room is used for the exhibition of lighting fittings and appliances. There is a small dais upon which cooking apparatus is mounted for public demonstration.

Fig. 1.—The New Yarmouth Showrooms.

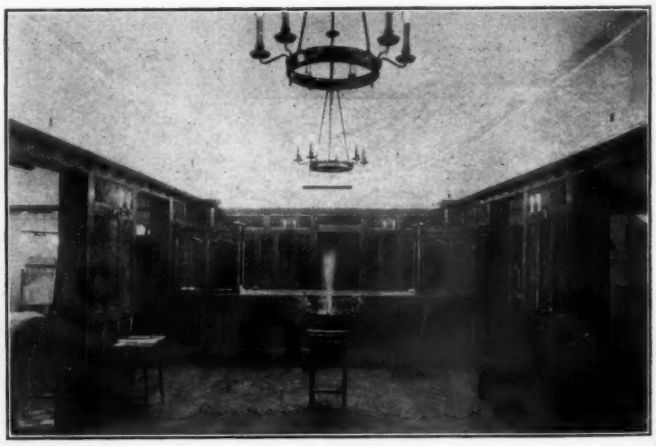


Fig. 2.—The Entrance Hall.

Polish Foreign Electrical Trade.

The value of apparatus, conductors, and electrotechnical materials imported into Poland during May last had a value of 7,924,000 zloty (£183,000). Exports of the same class were valued at 128,000 zloty (£3,000).

Advertisement Index Correction.

In our last issue the page number of the advertisement of the SPHINX ELECTRIC, LTD., was given in the index as "Supplement 2" instead of 26.

Employment during June.

The July *Ministry of Labour Gazette* says that employment during last month continued quiet, but showed a slight improvement on the whole, in spite of a seasonal decline in the motor vehicle section. Conditions in the latter branch were fair, however, and employment in electrical engineering remained fairly good. As regarded the industry as a whole, the number of unemployed (June 24th) declined by 1,971 to 78,119, the percentage falling from 8.2 to 8.0; in June, 1928, the figure was 9.0 per cent. In the electrical section the pro-

portion of unemployed remained at 4.6 per cent., the number being 3,680; the percentage in June, 1928, was 4.9. The electric cable, wire, and lamp manufacturing group reported 4,345 unemployed, representing a decrease from 5.7 to 5.0 per cent. (5.6 per cent. in June, 1928). On the other hand, the electrical wiring and contracting industry, with 1,196 unemployed, showed an increase from 7.3 to 7.7 per cent. (8.4 per cent. in June, 1928).

Bankruptcy Proceedings.

A. K. E. STRATHDEE (trading as "Emsco Radio"), electrical engineer, 923, Romford Road, Manor Park.—The first meeting of creditors was held on July 18th at the London Bankruptcy Court. The debtor stated that he began business in November, 1918, under the style of the Electrical & Mechanical Supplies Co., at Leytonstone Road, E., with a capital of £200 in cash and tools. In November, 1922, he registered the business as "Emsco Radio," and in July, 1928, he removed it to Romford Road, E. During March, 1927, he guaranteed a friend's bank overdraft to the extent of £180, and being called upon by the bank to meet the overdraft, he filed his petition on July 6th. Since 1925 he has sold goods under the hire-purchase system; a sum of £150 is due to him, but he only expects to realise £50. The liabilities are returned at £614, against assets of about £300. In the absence of any offer the estate was left with the Official Receiver to be administered in bankruptcy.

G. T. BAINES, electrical engineer, 66, High Street, Gorleston.—Receiving order made July 13th on debtor's own petition. First meeting, July 27th, at the Official Receiver's office, 9, Queen Street Chambers, Norwich. Public examination, September 19th, at the Town Hall, Great Yarmouth.

H. COHEN, known as K. COWEN (E. Cowen), electrical engineer, &c., 41 & 43, The Village, Lower Bebington, Chester.—First meeting, July 23rd, at the Official Receiver's office, Government Buildings, Victoria Street, Liverpool; public examination, September 25th, at the Court House, Birkenhead.

T. S. S. SOUTHWOOD, electrical engineer, Pound Farm, Whyke Road, Chichester.—Last day for proofs for dividend, July 30th. Trustee, Mr. R. W. Cave, Official Receiver, 12a, Marlborough Place, Brighton.

E. W. KIRK (Ace Radio Manufacturing Co.), wireless apparatus maker, 26, Curzon Street, Derby.—Last day for proofs for dividend, July 31st. Trustee, Mr. L. A. West, Official Receiver, 22, Regent Street, Park Row, Nottingham.

H. HOLMES, electrical contractor, &c., 60, Wards End, Loughborough.—Last day for proofs for dividend, July 31st. Trustee, Mr. G. L. Foulds, Federation Chambers, Wheeler Gate, Nottingham.

R. A. READ, 9, The Pavement, Middle Lane, Crouch End, N.8, electrical engineer.—Receiving order made July 16th on debtor's own petition. First meeting, July 29th; public examination, September 3rd; both at Carey Street, W.C.2.

COLONEL TEMPEST, 4, Manns Court, Bradford, electrician.—First meeting to-day (Friday) at the Official Receiver's office, 12, Duke Street, Bradford. Public examination, September 17th, at the County Court, Manor Row, Bradford.

D. BRAYSHAW, 78, Granby Street, Liverpool, electrician.—First meeting to-day (Friday) at the Official Receiver's office, Government Buildings, Victoria Street, Liverpool. Public examination, August 27th, at the Court House, Government Buildings, Liverpool.

E. R. D. LINDSAY, 96 and 98, Victoria Road, Aldershot, radio and cycle agent.—Discharge suspended for one year until June 6th, 1930.

A. B. GREGORY, 29, St. Albans Road, Seven Kings, Essex, wireless expert.—Trustee, Mr. T. Gourlay, Official Receiver, 29, Russell Square, W.C.1, released July 5th.

A. C. COOPER, 1a, Sherwood Street, Scarborough, electrical engineer.—Trustee, Mr. D. S. Mackay, Official Receiver, 48, Westborough, Scarborough, released July 1st.

J. E. DAWSON, High Street, Boston, Lincs., wireless engineer.—Last day for receipt of proofs for dividend, August 3rd. Trustee, Mr. C. G. Compton, 5, Church Close, Boston.

C. B. MARSDEN, 60, Pisgah Street, Kenfig Hill, Glam., electrical engineer.—Last day for receipt of proofs for dividend, August 3rd. Trustee, Mr. E. Owen, Official Receiver, 34, Park Place, Cardiff.

Company Liquidations.

HENDON ELECTRIC LAMP CO., LTD.—As we reported in our last issue, the statutory meeting of creditors was held on July 15th, at the offices of Messrs. F. Rowland & Co., 76, Finsbury Pavement, E.C. Mr. F. Rowland, the liquidator in the voluntary liquidation of the company, occupied the chair and submitted a statement of affairs which disclosed liabilities to unsecured creditors of £929, and net assets of £403; the latter amount was insufficient to pay the claim of the debenture holder, which totalled about £700, and consequently there were no assets available for the unsecured creditors. A receiver for the debenture holder had been appointed and was realising the assets. The company secured a contract for the supply of electric lamps to the Durban Corporation, running into some hundreds of pounds. Some of the lamps were rejected on the ground that they were faulty, and that put the company to considerable loss. Towards the close of last year the Omega Lamp Co. was a creditor for about £1,000, and it ultimately agreed to accept £750 in discharge of its claim. The company was, however, unable to settle, owing to the loss on the Durban contract and other matters, and it was asked to give a debenture to secure the Omega Co. The debenture was issued and the Omega Co. undertook not to exercise the right to foreclose so long as the company paid £40 a month. Some of the instalments were paid, but finally the company got into arrears and a receiver was appointed, after some time had been given to the company in which to look for further capital. The additional capital was not forthcoming and the receiver took possession. The debenture was perfectly good. In answer to a question, the liquidator said that Mr. C. D. Falcke, who had been identified with the company, had done his best to build up the concern, but unfortunately there was not very much capital in the business. A creditor said that he understood that Mr. Falcke was now carrying on business as the Hendon Lamp and Accessories Co., and Mr. Rowland said that when the receiver was appointed the trading ceased and he had been told that Mr. Falcke had commenced on his own account. No definite resolution was passed, but it was agreed that the voluntary liquidation of the company should be continued with Mr. Rowland as liquidator. The following are creditors:—

	£		£
Neglin Co.	80	London Commercial Stores, Ltd.	75
Ashdown, H. E., & Co. (Birmingham), Ltd. ...	26	Nelson Electric Co., Ltd.	50
Beko Lamp Co.	25	Universal Lamp Co. ...	67
Eltrem & Co.	32	Whitchurch Electric	
Hirschberg, E., & Co. ...	55	Lamp Co.	53

HIGHTENSITE AND EBONITE MANUFACTURING CO., LTD., Normandy Works, Custom House, E.16.—A meeting of creditors was held on July 18th at 8, Frederick's Place, Old Jewry, E.C., when Mr. A. A. Lough, C.A., liquidator, presided. According to the statement of affairs there were net liquid assets of £4,004. Against that amount, however, there were debentures and interest outstanding amounting to £16,782; there was thus a deficit so far as the debenture holders were concerned of £12,778. The unsecured creditors' claims amounted to £2,112, and there was a bank overdraft of £1,388. The company was incorporated in 1923 to take over the business of the Hightensite Co., Ltd., which was then in the hands of a receiver for the debenture holders. It had a capital of £3,002 paid up in cash and £10,000 worth of debentures also subscribed in cash. The business was purchased for £10,000. During the first two or three years, to September, 1925, the company was fairly successful and made profits. In 1926 there was a heavy loss. In May, 1927, it became necessary to find additional working capital. For that purpose second debentures were created for £5,000. No further profits had been made. In January of this year third debentures were issued for the sum of £1,400, which made a total issue of £16,400. On June 20th the debenture holder appointed Mr. H. Judd, the liquidator's partner, as receiver. At the same time the company called the shareholders together, and Mr. Lough was appointed liquidator on July 2nd. The receiver had taken possession of the business and assets. In 1927 a firm of valuers was asked to make a valution of the property. The value was put down at £22,000, and the company wrote that figure in its books. The receiver was carrying on the business, and he wished, if possible, to sell it as a going concern. There had been negotiations, but nothing definite had been arrived at. The debenture holder was the chairman of the company. If an offer was received, a further meeting of the creditors would be called to see whether the unsecured creditors approved of the offer, and likewise if it was decided to sell the business by auction the creditors would again be invited by the liquidator to attend a further meeting. It was decided to appoint an informal committee of inspection consisting of three of the creditors. The matter remains in the hands of Mr. Lough as liquidator. The following are creditors:—

	£		£
Buck & Hickman ...	70	Osborn & Sons	280
Bubell Bros.	158	Pickering, A. H. ...	120
Ebonite Containers ...	88	Rubber Regenerating,	
L.M.S. Railway	50	Ltd.	230

STEVENS & COLE, LTD.—Winding up voluntarily. Liquidator, Mr. H. Rainsbury, 65-66, Basinghall Street, E.C.2, appointed July 12th. A meeting of creditors is called for July 31st at Winchester House (Room 11), Old Broad Street, E.C.2.

DECORATIVE LIGHTING, LTD.—Winding up voluntarily. Liquidator, Mr. T. Taylor, 12, Wood Street, Cheapside, E.C.2, appointed July 12th. A meeting of creditors is called for July 31st at the liquidator's office. Particulars of claims to be sent to the liquidator by August 31st.

SOUTHEND RADIO AND GRAMOPHONE CO., LTD.—A meeting of creditors is to be held at Room No. 1, Caxton Hall, Westminster, S.W.1, on August 1st. Particulars of claims to be sent to the liquidator, Mr. T. L. Summers, 64, Victoria Street, S.W.1, by September 16th.

BIRCHINGTON AND WESTGATE ELECTRIC LIGHT CO., LTD.—A meeting of members is called for August 12th at 107a, Mortimer Street, Herne Bay, to hear an account of the winding up from the liquidator, Mr. S. W. Marshall.

RADIO INVESTIGATIONS, LTD.—A general meeting is to be held on August 21st at the offices of Messrs. Hope, Agar & Co., Pinners' Hall, Austin Friars, E.C.2, to hear an account of the winding up from the liquidator, Mr. F. H. W. Hope.

British Electric and General Insulators, Ltd.—A meeting of members is called for August 21st at the offices of the liquidator (Mr. F. H. Harman, 8, Regent Street, S.W.1) to hear an account of the winding up.

Dissolution of Partnership.

King Radio Co., manufacturers of radio and scientific apparatus, 5, Godwin Street, Bradford.—Messrs. J. Dyson and F. Harwood have dissolved partnership by mutual consent as from March 31st last.

Private Arrangements.

Weston Electric Lamp Co., 47, Victoria Street, S.W.1.—A meeting of creditors was held on July 12th at the offices of Messrs. Corfield & Cripwell, Balfour House, Finsbury Pavement, E.C., when Mr. W. A. J. Osborne presented a statement of affairs which disclosed liabilities of £2,896 and net assets of £1,451, leaving a deficiency of £1,445. The business had been continued with some variation of ownership since 1915. About 1921 a Mr. Cooper took an interest in the business and advanced £1,000, and in September of last year Mr. Seymour, who was the original owner of the business, entered into a limited partnership agreement with Mr. Cooper. That was carried out by the payment of a further £1,500 by Mr. Cooper. In November, 1928, a further £400 was lent to the business in order to meet trade liabilities. In 1922 and again at a later date Mr. Seymour formed two limited companies which were used solely as sales agencies, and through those companies sales were effected from the Weston Electric Lamp Co. and thereby the book debts shown in the statement of affairs had been created. It was decided that the estate should be dealt with under a deed of assignment in favour of Messrs. Osborne and S. Sharpe, Balfour House, Finsbury Pavement, E.C., as joint trustees. A committee of inspection was also appointed consisting of the representatives of the Lelios Lamp Co., Ltd., the Universal Electric Lamp Co., and Messrs. Thorpe & Sinnatt. The following are the principal creditors:—

	£		£
Electric Lamp Service Co.	80	Tungstalite, Ltd.	247
Lelios Lamp Co., Ltd. ...	377	Universal Electric Lamp Co.	190
Thorpe & Sinnatt ...	126		

Stone Manufacturing Co., 108 & 109, Great Saffron Hill, E.C., wireless and electrical dealers.—A meeting of creditors was held on July 12th at the offices of Messrs. Lever Bros. and Co., Chiswell House, Finsbury Pavement, E.C., when the representative of the Brownie Wireless Co., the largest creditor, presided. A statement of affairs showed liabilities of £1,937, and net assets of £196, leaving a deficiency of £1,741. It was reported that the debtor commenced business in July, 1927, at the present address, with no capital. He borrowed £80 from the bank which was secured by life policies and the debtor had previously an additional £200 from the same bank. At the end of the first year there was a debit balance of £321. The debtor still continued, as he had hopes of being able to continue the business successfully, but he could not get delivery of certain mouldings for his electrical trade and then concentrated on the manufacture of wireless coils. Unfortunately a slump set in and practically the whole of the debtor's orders were cancelled, and the coils had to be sold at a loss. There had also been a fire on the premises and a further £250 was lost although the debtor had recovered from the insurance company about £500. He then entered into negotiations with a certain firm whereby they were to advance monies and to form a limited company. The limited company was in fact formed, but nothing further had been done. It was on the understanding of this company being formed and sufficient money being put up to pay the creditors that further credit was given. Negotiations were pending whereby another company would take over the business and the creditors should receive a satisfactory dividend. The debtor was unable to make any offer on his own behalf. It was stated that the negotiations for the taking over of the business could only be carried out provided that the moulding tools were returned by the creditors who at present held them. Several creditors said that under no circumstances could those mouldings be returned. It was pointed out that the offer would therefore have to fall through. Questioned with regard to an offer, the debtor said that he hoped that, provided he were allowed to carry on the business, he would be able to pay the creditors 5s. in the £ within a year. If everything went through satisfactorily he would endeavour to pay the creditors in full. It was decided that the estate should be dealt with under a deed of assignment in favour of Mr. Lever as trustee with a committee of inspection. The following are creditors:—

	£		£
Brownie Wireless Co. ...	230	Johnson & Watts ...	105
Lewis Banks & Son ...	214	Stone, Mrs. M. ...	200
Ebonestos Insulators ...	119	Parr's Advertising ...	116

J. and W. Duffner, 116, Charlton Street, Euston Road, N.W.1, electrical engineer, &c.—A meeting of the creditors was held recently, when the debtor's solicitor reported liabilities of £1,294 and assets of £640, leaving a deficiency of £654. During the meeting the opinion was expressed that the estate should be protected, as one creditor had commenced proceedings. It was decided that a deed of assignment should be executed in favour of Mr. E. H. Hawkins, 4, Charterhouse Square, E.C., with a committee consisting of the representatives of the Electrical Importers' and Traders' Association, Messrs. Blundell, Spence & Co., Ltd., and Falk, Stadelmann and Co., Ltd. The following are creditors:—

	£		£
Blundell, Spence & Co., Ltd.	79	Duffner & Dilger ...	67
Falk, Stadelmann & Co., Ltd.	66	Philips Lamps, Ltd. ...	45
		Cable & Son	23
		Balding, J., & Son ...	20

Egyptian Electrical Imports.

The imports of electrical machinery and parts into Egypt during last year attained a value of £E152,389, as compared with £E212,260 in 1927.

New Zealand's Electrical Imports.

The imports of electrical machinery and equipment into New Zealand during April last attained a value of £166,159, as compared with £131,393 in the corresponding month of 1928.

Trade Announcements.

The Electric Furnace Co., Ltd., of 17, Victoria Street, S.W.1, recently concluded an agreement with Hirsch, Kupfer und Messingwerke A.G., Eberswalde, Germany, in accordance with which it has the right to the British and French patents, and the use of drawings and information relating to the various types of electric resistance furnace developed by the latter company. The Hirsch company's furnace equipment includes continuous strip-annealing plant, side-charged tube annealing furnaces, bright annealing furnaces, and furnaces for reheating ingots, in addition to a large battery of Ajax-Wyatt and Ajax-Northrup furnaces. The total consumption of electricity for furnaces at its works is about 18,000,000 kWh per annum.

Messrs. W. Perkins & Co., Western Garage, Exeter, announce the opening of an electrical department with a wiring and repairing staff.

Mr. N. Weatherston, Jnr., Union Chambers, 32, Grainger Street West, Newcastle-on-Tyne, has been appointed agent for the Electric Heating Co., Croydon, in the Tyne and Tees district.

The Bexley Heath works of Messrs. Young, Osmond and Young, Ltd., have been closed and production commenced on July 15th at new works in Welwyn Garden City, Herts. (Telephone: Welwyn Garden 516.)

Messrs. David Brown & Sons, Huddersfield, Ltd., have acquired a licence for the "Shorter" process for the surface hardening of gears of all kinds and have installed a complete plant.

Messrs. Charles Joyner & Co., to cope with expanding business, have acquired a new factory at 223-225, Newtown Row, Birmingham (Telephone: Aston Cross 0613), to which they are moving on July 27th.

Messrs. Anslow, Ltd., High Street, Coventry, have added to their business a new department for electrical and wireless goods, and on July 24th they opened in Hey Lane an electrical showroom, with five all-electric windows.

The London office and depôt of Messrs. J. A. Crabtree and Co., Ltd., have been removed to 12, Dyott Street, New Oxford Street, W.1. (Telephone: Temple Bar 2741.) The telegraphic address is unaltered.

Book Notices.

We have received from Siemens-Schuckert (Great Britain), Ltd., an elaborately-produced volume ("Siemensbauten," by Hans Hertlein) dealing with the great Siemens concerns. It contains about a hundred photographic views and drawings. The first print is an aerial view of Siemensstadt which conveys an excellent idea of the immensity of the works. An artist's impression of the "Schaltwerk-Hochhaus" is a notable feature of the work. This building is a remarkable one in many respects, but it has been rather overdone photographically; there are no fewer than 21 views of the exterior from various angles and elevations.

"The Post Office Electrical Engineers' Journal." Vol. XXII. part 2. July, 1929. London: The Electrical Review, Ltd. Price 1s. 3d. net.

"*Journal* of the Institution of Engineers (India)." Vol. VIII. April, 1929. Calcutta: The Institution. Price Rs. 10 per annum.

"*Journal* of the Institution of Electrical Engineers." Vol. LXVII. No. 391. July, 1929. London: E. & F. N. Spon, Ltd. Price 10s. 6d.

"Heat Treatment Bulletin No. 42: The Heat Treatment of High-Tensile Aluminium Alloys," by A. R. Page. London: Wild-Barfield Electric Furnaces, Ltd.

Application for Patent Extensions.

Application has been made by the Standard Telephones and Cables, Ltd., for the extension for five years of the following patents granted to the Western Electic Co., Ltd.: No. 18,013 of 1913 and No. 17,936 of 1921, for "Improvements in Telephone Transmission Systems," and No. 20,179 of 1913 for "Improvements in Telephone Transmission Circuits."

For Sale.

Walton-upon-Thames Urban District Council Electricity Department invites offers for the purchase of two 125-kVA oil-cooled "Berry" transformers. (See our advertisement pages to-day.)

Social Events.

The second and third of the annual series of golf competitions held at Preston by the staff of Siemens Lamp Works have recently been decided. In the "S. H. Callow" golf competition (18 holes medal play) the successful competitors were: 1, A. G. Ogles; 2, S. Facer, junr.; and 3, J. Lawrence. For the "W. O. Smith" prize, a "graveyard" competition was chosen, and this was won by A. Facer, with W. Higginson and K. G. Lochhead second and third, respectively. In the singles bowling tournament, A. Dilworth beat J. Foort in the final, the defeated semi-finalists being T. Wood and W. Marsh. All the competitions were held at Ashton Park, Preston, the sports ground of the Dick Kerr Club.

The 9th annual Witton sports meeting of the General Electric Co., Ltd., was held recently on the company's ground at Witton. The attendance was about 5,000, and various challenge cups were offered to competitors from all works and branches of the G.E.C. throughout the country. There were 427 competitors, representing 1,200 entries. The accompanying illustration shows the commencement of the Senior Wranglers' race, the competitors, reading from left to right, being Dr. Garrard and Messrs. Krause and Whitford.

An Amusing Race at Witton.

Payment for Holidays.

Under an arrangement between the Huddersfield Engineering Employers' Association and the various trades unions concerned to take their annual holidays about the third week in July, the engineers' holidays this year extend from July 19th, to July 29th. The directors of Messrs. Hopkinsons, Ltd., have decided to pay a full week's wages to all employés who are not in receipt of standing wages, and who have been in the employment of the company for more than 12 months. The employés benefiting number approximately 1,100.

Malayan Electrical Imports.

The imports of electrical goods and apparatus into Malaya during March last had a value of £51,991, of which £32,005 worth originated from the United Kingdom. The total imported during the first quarter of 1929 was £183,883, as compared with £244,666 during the corresponding period of 1928.

Recent Contracts.

A contract has just been placed with the GENERAL ELECTRIC CO., LTD., for electrical equipment for the rolling stock required in connection with the Manchester-Altrincham electrification scheme. The Manchester-Altrincham line is controlled jointly by the London, Midland & Scottish and London and North-Eastern Railways, so that tenders were submitted for approval and recommendation to the engineers of both these companies, and the placing of the order with the G.E.C. is the result of their joint recommendation. This is the first passenger line electrification scheme which has been undertaken on the standard system, 1,500 V d.c., and consequently this is the first order ever placed in this country by the home railways for 1,500-V equipments, apart from the locomotives on the Newport-Shildon lines, which are used exclusively for mineral traffic. The contract covers 100 heavy railway motors, each rated at 328 b.h.p., on the one-hour rating, together with electro-pneumatic contactor-type control equipments for 24 motor coaches, 22 driving trailer coaches, and 23 trailer coaches. Air-operated pantographs for current collection from an overhead wire and also motor-generator sets for supplying l.p. energy for the control and lighting circuits are also included. The order also covers the complete heating and lighting equipment for the 68 coaches; the heating will be carried out at the line voltage of 1,500. The contract has a total value of over £100,000.

The BRITISH THOMSON-HOUSTON CO., LTD., has received an order for the rotary convertors required for the electrification, while the contract for the overhead equipment has been placed with CALLENDER'S CABLE & CONSTRUCTION CO., LTD.

BIRMINGHAM ELECTRIC FURNACES, LTD., has received an order from Messrs. David Brown & Sons (Huddersfield), Ltd., for a furnace having a usable hearth 14 ft. long by 3 ft. 3 in. wide with a maximum rating of approximately 200 kW. This furnace is double-ended and will be used for re-heating and carburising. It is believed that this will be the largest electric furnace for this purpose in the country. Messrs. David Brown and Sons have already four electric furnaces in operation for heat treatment purposes, three of which were supplied by the company.

Contracts awarded to the ALTON BATTERY CO., LTD., in January by the Australian Postmaster-General have been followed by a further Australian contract for batteries for Marouba, Box Hill, Oakleigh, Cottesloe, Hurstville, Sale and Fremantle telephone exchanges. In addition, batteries of C.E.M.F. cells are to be supplied for Box Hill, Oakleigh, Semaphore and Cottesloe telephone exchanges. The batteries range in capacity from 181 to 1,015 Ah. A further repeat order from Canada for an Alton battery of 4,630-Ah capacity has also been received recently.

Pirelli-General Oil-Filled Cables.

We regret that in the advertisement of the PIRELLI-GENERAL CABLE WORKS, LTD., in our last issue (Advertisement Supplement, p. 8) two incorrect blocks were used. As will be seen from the corrected advertisement which appears in this issue, the correct diagrams give a comparison of costs of ordinary and oil-filled cables.

Exhibition of Inventions.

The fifth International Exhibition of Inventions opens in the Central Hall, Westminster, on October 2nd next. As in previous years the Exhibition will be divided into a Trade Section and a New Inventions Section and gold, silver and bronze medals will be awarded.

Winding-up Petition.

MILLS ENGLISH ENGINEERING CO., LTD.—A petition for the winding-up of this company has been presented by the Wellington Tube Works, Ltd., and it will be heard at the Town Hall, Swansea, on August 7th. The solicitors for the petitioners are Messrs. Phœnix, Levinson & Walters, 8, Dumfries Place, Cardiff.

New Metro-Vick Premises in Newcastle.

The accompanying illustration shows the new premises of the Metropolitan-Vickers Electrical Co., Ltd., in Northumberland Road, Newcastle-upon-Tyne. The commodious building is well equipped on thoroughly up-to-date lines. At present the offices only are in use; the extensive showrooms will be opened shortly.

The New Metro-Vick Premises in Newcastle.

Wages in the Cable-making Industry.

A "cost-of-living" alteration in wages will take effect in the cable-making industry on the third pay-day in August. We have received from the Joint Industrial Council for the industry a schedule of the new rates.

New Catalogues and Lists.

BLACKSTONE & CO., LTD., Stamford.—A descriptive and illustrated folder dealing with the company's petrol and crude-oil portable engines, pumps, compressors, &c. Priced.

HIGGS MOTORS, Witton, Birmingham.—Stock list for July of a.c. and d.c. motors.

PHILIPS LAMPS, LTD., Philips House, 145, Charing Cross Road, W.C.—A leaflet giving particulars of the Philips current and polarity indicator. Illustrated and priced.

MAWDSLEY'S, LTD., Dursley, Glos.—A descriptive folder of dynamos and motors. Also a blotter.

CALLENDER'S CABLE & CONSTRUCTION CO., LTD., Hamilton House, Victoria Embankment, E.C.4.—A booklet giving some useful wiring hints, and diagrams of the "Kalibond" wiring system.

Calendar-blotters for July have been received from WARREN BROS. (MIDDLESBROUGH), LTD., 91 and 93, Grange Road, Middlesbrough; S. G. ROGERS & CO., LTD., 15, Fitzroy Street, Tottenham Court Road, W.1; MAVOR & COULSON, LTD., 47, Broad Street, Mile End, Glasgow; C. J. HAWKINS AND CO., 43, Great Saffron Hill, E.C.1; and the JACKSON ELECTRIC STOVE CO., LTD., 143, Sloane Street, S.W.1.

CROSSLEY BROS., LTD., Openshaw, Manchester.—A brochure describing Crossley producer gas plants (publication No. 1275), a folder illustrating the company's products and outlining its history (publication No. 1048a), and a souvenir booklet of the visit of the Institution of Mechanical Engineers to the company's works during the summer meeting of the Institution at Manchester (publication No. 1286).

DALLOW, LAMBERT & CO., LTD., Spalding Street, Leicester.—A folder illustrating and describing the "D.L." industrial vacuum cleaner for use in offices, factories, workshops, &c.

O. E. MALINVERNO, 37, Walbrook, E.C.4.—An illustrated brochure drawing attention to switchboard recording instruments manufactured by the C.G.S. Società Anonima per Istrumenti Elettrici, of Milan, for whom Mr. Malinverno is the British agent.

ELECTRIC CONTROL, LTD., Lewes Road, Brighton.—A descriptive leaflet of the "Empire" vertical disconnecting switch for overhead-line rural electrification.

DRAYTON REGULATOR AND INSTRUMENT CO., LTD., West Drayton, Middlesex.—Two pamphlets advertising Nicholson and differential steam traps and radiator and industrial steam traps.

ASCOG, LTD., 44, Theobald's Road, W.C.1.—A series of illustrated pamphlets dealing with the company's coloured lighting units for window display, illuminated letters, flashing lamps, pendant fittings, &c. Priced.

MESSRS. FERRANTI, LTD., Hollinwood, Lancs.—Pamphlet Tc155, illustrating and describing the company's standard a.c. testing equipments. Prices are given in a separate pamphlet (Tc155/1).

MARCONI'S WIRELESS TELEGRAPH CO., LTD., Marconi House, Strand, W.C.—Leaflets Nos. 1091, 1094, 1095, 1098 and 1096, describing and illustrating respectively types P.A.5 and P.A.6 broadcasting transmitters, types 11g, D.F.M.3 and D.F.M.4 direction finders, and the new 2 kW type M.C.6 transmitter.

Messrs. L. ROBINSON & CO., London Chambers, Gillingham, Kent.—Two pamphlets advertising "Jubilee" worm-drive clips for various purposes.

The B.E.N. PATENTS, LTD., 92, Tottenham Court Road, W.1.—Two illustrated publications dealing respectively with the company's compressed-air units (priced) and with a mechanical polisher.

Messrs. NEWTON & WRIGHT, LTD., 471-3, Hornsey Road, N.—A booklet illustrating and describing apparatus for radiology, including h.p. transformer units.

GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.—The Osram G.E.C. Bulletin for July, containing articles on Osram lamps, valves, floodlighting, "Magnet" domestic appliances, &c.

ST. HELENS CABLE & RUBBER CO., LTD.—A leaflet advertising adhesive rubber tape. Priced.

Messrs. TURNER BROTHERS ASBESTOS CO., LTD., Rochdale.—A well produced brochure showing actual installations of "Sindanyo" insulating boards.

VERITYS, LTD., Aston, Birmingham.—Publication No. 1074 dealing with the company's fans for use on board ship.

Messrs. A. H. HUNT, LTD., Tunstall Road, Croydon.—Catalogue No. 61, of the company's products, including wireless apparatus, batteries, hand lamps, &c. Also a stock list of commercial types of voltmeters and ammeters, and circular letters drawing attention to the Hellesen dry cell, trade discounts, &c.

A. P. LUNDBERG & SONS, LTD., 477 to 489, Liverpool Road, Holloway, N.—A pamphlet advertising the "Tripolit" switch.

Price Reductions.

PHILIPS LAMPS, LTD., 145, Charing Cross Road, W.C.2, announces reductions in the price of its "Phillilite" commercial diffusing units.

Unemployment.

There was an increase of 1,818 in the number of registered unemployed during the week ended July 8th, the total at that date being 1,144,200, as compared with 1,142,382 on July 1st and 1,242,433 on July 9th, 1928.

Annual Holidays.

The works of BRITTAIN'S ELECTRIC MOTOR CO., Dermody Road, Lewisham, will be closed for the annual holidays from August 3rd to August 11th inclusive.

Wages in the German Engineering Industry.

In the current *Ministry of Labour Gazette* there is a summary of the results of an inquiry into hours and earnings in the Berlin metal and engineering industries. Reports on other centres are to be published later. The Berlin inquiry covered 29 undertakings employing 81,146 workers (about a third of the total workers in the area). Of these 76 per cent. (61,687) were employed in electrical engineering and apparatus manufacture, and 12.8 per cent. (10,413) in general engineering and boiler-making. The inquiry was limited to men over 21 years of age and women over 18, and it showed that 65 per cent. of the workers covered were piece-workers. The article gives average hourly and weekly earnings of four classes of worker—skilled, semi-skilled, unskilled and women, and compares them with the pre-war rates. It is shown, generally speaking, that time-work earnings are slightly higher and piece-work earnings slightly lower than before the war. A weighted average showed that 47.7 per cent. of the workers had a 48-hour week, 26.7 per cent. had shorter hours, and 25.6 per cent. longer hours. The actual average weekly earnings in October, 1928, of the various classes of workers are shown for seven branches of the industry. So far as electrical engineering was concerned, the rates were as follows, piece-work earnings being shown in parentheses:—Skilled, 56.02 Reichsmarks (59.08 Rm.); semi-skilled, 44.69 Rm. (48.88 Rm.); unskilled, 40.08 Rm. (44.47 Rm.); women, 27.36 Rm. (30.97 Rm.). The Reichsmark has a value of about 11.8d.

Since the inquiry the agreed rates in the engineering industry have been increased (in April last) by from 0.047 to 0.057 Rm. per hour.

Prices of Materials.

The following prices are only general, and they may vary according to quantities and other circumstances:—

	CHEMICALS, &c.	Price July 23rd.	Fortnight's inc or dec.
a	Acid, Oxalic ... ... per lb.	5½d.	...
a	Ammoniac, Sal ... ... per ton	£60	...
a	Ammonia, Muriate (large crystal) ,,	£52	...
a	Bisulphide of Carbon ... ... ,,	...	...
a	Borax ... ... ,,	£25	...
a	Copper Sulphate ... ... ,,	£25 10s.	...
a	Potash, Chlorate ... ... per lb.	3½d. to 4d.	...
a	,, Perchlorate ... ... ,,	5½d.	...
a	Shellac ... ... per cwt.	£18 10s.	...
a	Sulphur, Commercial ... ... ,,	£11	...
a	,, Roll ... ... ,,	£11	...
a	Soda, Chlorate ... ... per lb.	3d.	...
a	,, Crystals ... ... per ton	£5 to £5 5s.	...
a	Sodium Bichromate, casks ... per lb.	3½d.	...
	METALS, &c.		
b	Aluminium, Ingots ... ... per ton	£95 to £100	...
b	,, Wire ... ... per lb.	1/1 to 1/9	...
b	,, Sheet ... ... ,,	1/1 to 2/9	...
p	Babbitts Metal and Anti-friction Metals—		
	Grade I ... ... per ton net	£196	£9 inc.
	Grade II... ... ... ,, ,,	£137	£5 inc.
	Grade III ... ... ,, ,,	£75	£2 inc.
c	Brass (rolled metal 2" to 12" basis) per lb.	10¼d.	...
c	,, Tubes (solid drawn) ... ,,	1/0½ to 1/1	½d. dec.
c	,, Wire, basis ... ... ,,	11½d.	...
c	Copper Tubes (solid drawn) ... ,,	1/8	½d. dec.
c	,, Bars (best selected) ... per ton	£110	...
c	,, Sheet ... ... ,,	£110	...
c	,, Rod ... ... ,,	£110	...
d	,, (Electrolytic) Bars ... ,,	£-4 10s.	...
d	,, ,, Sheets ... ,,	£143 10s.	...
d	,, ,, Wire Rods ,,	£94 10s.	...
d	,, ,, H.C. Wire per lb.	11¾d.	...
f	Ebonite Rod... ... ... ,,	2/3 to 2/6	...
f	,, Sheet ... ... ,,	2/3 to 2/6	...
n	German Silver Wire ... ... ,,	2/2	...
h	Gutta-percha, fine ... ... ,,	nom.	...
h	India-rubber, Para fine ... ... ,,	11½d.	½d. dec.
l	Iron, Pig (Cleveland No. 3.) ... per ton	72/6	...
l	,, Wire, galv. No. 8. P.O. qual. ,	£21	...
g	Lead, English pig ... ... ,,	£24	10s. dec.
g	Mercury ... ... per bot.	£22 2s 6d. to £22 5s.	...
e	Mica (in original cases) small ... per lb.	3d. to 3/-	...
e	,, ,, medium ,,	4/- to 8/-	...
e	,, ,, large ... ,,	10/- to 20/- & up	...
p	Phosphor Bronze, plane castings ,,	1/8½	...
p	,, ,, drawn bars & rods ,,	1/5	...
p	,, ,, rolled strip & sheet ,,	1/8½	...
p	,, ,, wire... ... ... ,,	1/6½	...
o	Platinum ... ... per oz.	£13 17s. 6d.	...
d	Silicium Bronze Wire ... ... per lb.	1/9½	...
r	Steel, Magnet, in bars ... ... ,,	7½d.	...
n	Tin, Block (English) ... ... per ton	£213 10s. to £214	£8 10s. inc.
n	,, Wire, Nos. 1 to 16 ... ... per lb.	3/8	...

*For 1 cwt. lots. Special quotations against definite specifications.

Quotations supplied by

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co., Ltd.
p C. Clifford & Son, Ltd.
r W. F. Dennis & Co.

Messrs. James Forster & Co., reporting on July 20th, stated that the demand for lead in this country and on the Continent is still very slow, and it is remarkable that prices keep so steady. This is probably due to the fact that supplies are not excessive, and there is no pressure to sell. According to Metal Exchange statistics, 8,307 tons was shipped from Australia in June against 11,163 tons in May, while Burma shipments were also reduced by 500 tons. There is nothing in the position at present to justify higher prices, but sentiment in other metals is more "bullish," and this, in time, may spread to the lead market.

Lighting and Power Notes.

Accrington.—CHANGE-OVER.—The Corporation Electricity Committee, on July 19th, decided to push forward with the change-over of electricity supply from d.c. to a.c. in order to provide work for men at the electricity works who might otherwise be dispensed with. The Corporation obtained an Order in 1925 authorising the change-over. The effect of this decision is that work which would have been spread over 10 to 14 years will now be put in hand immediately, and the change-over carried through as speedily as possible. Capital expenditure will reach £42,000. Application will be made with a view to a grant toward the cost being obtained.

Argentina.—BUENOS AIRES.—The new super power station which the Compañia Hispano Americana de Electricidad has constructed in the new port of Buenos Aires has now been opened.

Brighton.—LOANS SANCTIONED.—The Corporation Electricity Committee has received sanction to loans totally £60,095 for alterations and additions at Southwick power station and £48,000 for alterations and additions to buildings in North Road.

Bangor.—YEAR'S WORKING.—Mr. Price White, electrical engineer to the Corporation, in his annual report states that the net surplus on the undertaking was £1,051 for the year ended March 31st last. Although prices had been reduced, the flat rate of 7d. per unit for lighting was still too high. The department had to endeavour to lower the price per unit which had to be paid for the bulk supply and to achieve this must increase the sales of the electricity during the non-peak hours. He had discussed the question of a revision of the arrangement with the North Wales Power Co. and hoped in the near future to make a recommendation to the Council.

Barking Town.—YEAR'S WORKING.—The accounts of the Urban District Council's electricity undertaking (engineer: Mr. W. Holmes) for the year ended March 31st last shows a total income of £37,774 and working expenses of £27,777, leaving a gross profit of £9,997. After payment of capital charges there was a net surplus of £3,857. The electrical energy sold increased from 3,440,689 to 4,013,439 kWh.

Bexhill.—MAINS EXTENSIONS.—The Corporation Electricity Committee is to extend mains at an estimated cost of £2,754 to supply electricity to houses on the Pebsham estate.

Bradford.—VALLEY ROAD STATION.—At a recent meeting of the Corporation Electricity Committee it was reported that sanction had been received to a loan of £50,000 in connection with the reorganisation of the e.h.p. switchgear at the Valley Road power station, and that the Central Electricity Board had suggested certain modifications in the scheme to make provision for connecting the station to the grid. The engineer reported that the modifications based on the tender accepted would involve an additional cost of £8,624.

NEW SUB-STATION.—The Electricity Committee has approved a scheme by the city electrical engineer for the erection and equipping of a traction sub-station at Norman Lane, Eccleshill, at an estimated cost of £21,580, including mains.

Bromley.—YEAR'S WORKING.—The report on the Corporation's electricity undertaking (engineer: Mr. W. G. Trend) for the year ended March 31st last shows a total revenue of £46,652, as compared with £53,893, the decrease being due to reductions made in the charges for electricity during the year. Working expenses amounted to £21,332, as against £19,170, leaving a gross profit of £25,319 (£34,723), to which was added a balance brought forward of £21,726, and revenue from other sources making £47,532 available. Capital charges accounted for £17,110, contributions to capital account totalled £1,421, the reserve fund received £14,500, and £1,500 was transferred to the borough fund, leaving a balance carried forward of £13,002. The electricity sold increased from 2,331,601 to 2,965,790 kWh, and the average price obtained per kWh fell from 5.24d. to 3.66d.

Canterbury.—LOAN.—The Town Council has applied for sanction to a loan of £5,000 for mains extensions.

Cardiff.—YEAR'S WORKING.—The report of the borough electrical engineer (Mr. C. G. Morley New) on the working of the Corporation electricity undertaking for the year ended March 31st last shows a total income of £261,812 and working expenditure of £119,934, leaving a gross profit of £141,877. The figures for the previous year were:—Income, £264,776; working expenses, £113,026; gross profit, £151,750. To the gross profit was added revenue from other sources, making a total of £149,770, and from this were deducted capital charges amounting to £103,268, leaving a net surplus of £46,503, as compared with £68,284 in 1927-28. The sales of electrical energy increased from 38,339,859 to 40,117,108 kWh, and the average price obtained per kWh fell from 1.66d. to 1.56d. The length of cables laid (exclusive of service cables) increased by 72 miles to 481 miles. A new 10,000-kW turbo-alternator was put into commission during the year.

Carlisle.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer: Mr. C. W. Salt) for the year ended March 31st last shows a total income of £89,542, as compared with £84,331 in 1927-28. Working expenses totalled £47,539, as against £49,439, and there was a gross surplus of £42,003 (£34,892). After payment of capital charges there was a net surplus of £4,793, as compared with £37 in the previous year. The electrical energy sold increased from 11,947,855 to 12,919,432 kWh, and the average price obtained per kWh fell from 1.69d. to 1.66d. Sanction was received during the year to the installation of a 15,000-kW turbo-alternator with boiler, &c., and it is anticipated that this set will be put into commission during the current year.

Douglas (I. of M.).—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer: Mr. B. Kelly) for the year ended March 31st last show a total revenue of £33,696, as compared with £31,371 in the preceding year. Operating expenses amounted to £16,771, as against £15,004, and there was a gross surplus of £16,925 (£16,367), to which was added a balance of £925 brought forward from the previous year and bank interest of £242, making a total of £18,092. Capital charges absorbed £16,445, and there was a net surplus of £1,647. The capital expenditure during the year amounted to £44,229, and included £26,972 for machinery. The sales of electricity increased from 1,616,864 to 1,799,355 kW.

East Ham.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer: Mr. W. R. Elliott) for the year ended March 31st last show a total income of £111,159, as compared with £107,333 in the preceding year. Working expenses amounted to £71,420, as against £66,293, leaving a gross profit of £39,739 (£41,040), to which was added a balance from the preceding year, and revenue from other sources making a total of £56,562 available. After providing for capital charges, contributing sums from revenue to capital expenditure, and transferring £1,586 to the borough fund, and £15,221 to depreciation and renewals fund, there was a net surplus of £8,524, as compared with £16,806 in 1927-28. The sales of electricity increased from 9,584,340 to 11,493,340 kWh, and the maximum load from 4,875 to 5,635 kW. The average price obtained per kWh fell from 2.598d. to 2.246d.

Federated Malay States.—KUALA LUMPUR.—We have received from Mr. W. J. Williams, director of the Federal Electrical Department, a copy of his report, together with the statement of accounts, for the year ended December 31st last. The total revenue amounted to £178,664, and working expenses were £88,616, leaving a gross profit of £90,948, from which was deducted interest and sinking fund reserve totalling £57,585. The net surplus therefore was £32,463. The electrical energy sold amounted to 14,155,371 kWh, the bulk of which was consumed in Kuala Lumpur.

Ipswich.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer: Mr. A. S. Black) for the year ended March 31st last show a total income of £140,587, as compared with £132,808 in 1927-28. Working expenses increased from £70,818 to £72,659, leaving a gross profit of £67,928, as against £61,990. After meeting capital charges there was a net surplus of £19,368, as compared with £19,766 in the previous year. A contribution of £4,000 was made to the borough fund. The capital expenditure during the year amounted to £47,608, the chief item being £26,785 for mains. The sales of electrical energy increased from 14,439,261 to 16,789,068 kWh, and the maximum supply demanded increased from 8,600 to 9,950 kW.

Leith.—NEW POWER STATION.—The Dock Commissioners have decided to erect a new power station at the Imperial Dock, Leith, at an estimated cost of over £16,000. The object is to supersede the present steam-driven plant at the Edinburgh Dock by modern electrically-driven plant at the new power house.

London.—STOKE NEWINGTON.—The Borough Council Electricity Committee has considered a report submitted by Mr. A. M. Sillar, consulting engineer, as to the best means of meeting the increased demand, in which he has made the following proposals:—(1) The d.c. supply to be augmented by means of two new sub-stations in the northern and southern parts of the borough; (2) the southern sub-station to be supplied from Edward Lane through a 10,000-V ring main and the northern sub-station through a single 10,000-V main; (3) the transference of the existing feeder booster to one of the northern feeders; (4) the provision of new distribution cables in connection with the sub-stations. The estimated cost of the scheme is £30,000, and the Committee has recommended that it be adopted and that application be made for sanction to a loan for the purpose.

BATTERSEA.—The Borough Council Electricity Committee has instructed the borough electrical engineer to prepare detailed plans for the erection of a boiler-house at the power station at a cost of £30,680. The Committee has decided to arrange to supply electricity in the Portslade Road district at a cost of £6,162.

SHOREDITCH.—The Borough Council Lighting Committee has recommended that the expenditure of £49,350 for the erection of a sub-station, provision of converting plant, e.h.p. and l.p. switchgear, &c., be approved, and the Financial Committee has recommended that application be made for sanction to a loan for this purpose.

HAMMERSMITH.—The Electricity Committee has recommended the extension of mains, at an estimated cost of £1,787.

HOSPITAL SUPPLY.—The L.C.C. Mental Hospitals Committee has recommended the installation of electricity at Hanwell Mental Hospital at a cost of £23,000. It is proposed to take the supply from the Metropolitan Electricity Supply Co., Ltd.

Louth.—ELECTRICITY SUPPLY.—In connection with the electricity scheme, by which a supply is to be obtained in bulk, the Town Council has fixed the charges at 8d. per kWh for lighting, and at 3d. per kWh for power and heating.

Mountain Ash.—REVISION OF CHARGES.—The Urban District Council has introduced the following revised scale of electricity charges:—Lighting: Ordinary meters, 3½d. per kWh, with a discount of ½d. per kWh for prompt payment; slot meters, 5d. per kWh for the first six years and 3½d. per kWh afterwards. Shop-window lighting: 3d. per kWh, less ½d. per kWh discount. Heating and cooking: For less than 15 kWh per quarter the charge is at the ordinary meter lighting rate, and where the amount exceeds 15 kWh, 2d. per kWh; special contract rate of 1½d. per kWh, less ½d. per kWh discount for a minimum consumption of 120 kWh per quarter. Power: 2d. per kWh.

Portland.—LOAN.—The Urban District Council Electricity Committee has obtained sanction to the borrowing of £8,186 for mains and services and £1,278 for plant.

Portsmouth.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer: Mr. B. Handley) for the year ended March 31st last show a total income of £255,217, as compared with £232,207 in 1927-28. Working expenses increased from £144,169 to £153,330, and the gross profit from £88,038 to £101,887. To this was added income from other sources, making a total of £102,367. After providing for capital charges and contributions to capital expenditure from revenue, there was a net profit of £17,605, as compared with £13,042 in the preceding year. The capital expenditure during the year amounted to £139,783, the chief items being £55,705 for machinery and £49,417 for mains and services. The electricity sold increased from 25,285,858 to 29,480,872 kWh, and the maximum supply demanded from 13,200 to 15,500 kW.

Price Reductions.—Reductions in the charges for electricity have been made or recommended in the following districts:—

LONDON.—*Stoke Newington.*—Power: Scale E from 2d. per kWh for the first 5,000 kWh per annum, 1½d. for the next 5,000 kWh, and 1d. per kWh beyond, to 1½d. for the first 10,000 kWh, and 1d. per kWh for all further consumption.

County of London Electric Supply Co., Ltd.—Lighting: Flat rate from 6d. to 5½d. per kWh. Two-part tariffs: From 1d. to ¾d. per kWh.

ESTON.—Lighting: First 250 kWh per quarter, 6d. per kWh; next 250 kWh, 5½d.; over 500 kWh, 5d. per kWh.

South-West Midlands.—YEAR'S WORKING.—The South-West Midlands Advisory Joint Committee has recently issued its annual report to the Electricity Commissioners. The district covers an area of upwards of 1,300 sq. miles. The generating plant capacity in the area is 256,500 kW. The electricity sold shows an increase of 12¼ per cent. at 422¼ million kWh, and the electricity sold per head of population has increased from 191 kWh in 1926-7 to 228 kWh in 1927-8, and to 255 kWh in 1928-9, the number of consumers having increased during the past year by 20 per cent.

Special Orders.—Application has been made to the Electricity Commissioners by the West Lancashire Rural District Council for a Special Order authorising it to supply electricity in certain parishes in the rural district.

The Commissioners have submitted to the Minister of Transport for confirmation a Special Order made by them authorising Colne Corporation to supply electricity in the urban district of Trawden.

Swansea.—LOANS.—The Corporation Electricity Committee is applying for sanction to borrow £150,000 for mains and services and £10,000 for meters.

Uckfield.—REVOCATION OF ORDER.—The Rural District Council has decided to apply to the Electricity Commissioners for the revocation of the powers of the Uckfield Gas & Electricity Co. to supply electricity to Buxted and Hadlow Down, and for the transfer of those powers to the Weald Electricity Co., which is in a position to give a supply of electricity forthwith.

Wimbledon.—YEAR'S WORKING.—The report of the borough electrical engineer (Mr. A. E. McKenzie) on the working of the electricity undertaking during the past year shows a total income of £171,060, and working expenditure of £82,350, leaving a gross profit of £88,710, to which was added a surplus from the hire-purchase of apparatus of £692, making £89,402 available. Capital charges absorbed £62,340 and there was a net surplus of £27,063, as compared with a profit of £33,090 in the preceding year. The capital expenditure during the year amounted to £123,194, the chief items being £37,590 for machinery and £48,019 for mains and services. The sales of electricity increased from 18,411,699 to 22,467,621 kWh, and the maximum supply demanded from 9,650 to 13,050 kW. The average price obtained per kWh fell from 1.887d. to 1.660d. A new 3,750-kW turbo-alternator and boiler plant were put into commission during the year and a further boiler unit is in course of erection.

Tramway and Railway Notes.

Barking Town.—YEAR'S WORKING.—The report on the working of the Urban District Council's tramway undertaking (manager: Mr. W. Holmes) for the year ended March 31st last, shows a total revenue of £4,552 and working expenses of £4,537, leaving a gross profit of £14, to which was added revenue from other sources, making a total of £390. Capital charges totalled £4,466 and there was a net loss of £4,076.

Chile.—UNDERGROUND RAILWAY.—The contract for the first underground railway to be constructed on the west coast of South America has recently been awarded by the municipal authorities of Santiago to a Chilean engineer.

East Ham.—YEAR'S WORKING.—The report on the working of the Corporation tramway undertaking (manager: Mr. W. R. Elliott) for the year ended March 31st last, records a total revenue of £118,824, as compared with £109,123 in 1927-28, and working expenditure of £96,582, as against £97,589, leaving a gross profit of £22,242 (£11,534). To this was added £15,900 transferred from the borough fund and other revenue, making a total of £40,725. After payment of capital charges, &c., and deducting a deficiency from the previous year of £15,900 there was a loss of £6,787. The number of passengers carried increased from 18,789,140 to 21,804,654, and the car miles run from 1,782,277 to 1,992,334. The total revenue per car mile fell from 13.76d. to 13.64d.

NEW ROUTE.—It was announced at a meeting of the Town Council on July 9th that it was proposed to construct a new tramway route to Becontree.

Glasgow.—FARES REVISION.—The Corporation Tramways Committee has decided to increase the minimum tramway fare from ½d. to 1d., and to increase the maximum fare from 2d. to 2½d. with corresponding adjustments of the intermediate charges. The revised fares will come into operation on August 11th, if approved by the Corporation.

Haslingden.—'BUSES *v.* TRAMS.—On the question of substituting omnibuses for trams on the Accrington-Haslingden-Rawtenstall system, the Town Clerk has received from the Accrington Corporation a letter stating that it had been agreed by Accrington and Rawtenstall Corporations to refer the matter for investigation to the respective borough treasurers and tramway managers, and after the report had been received, representatives of the two Corporations would meet Haslingden representatives to further discuss the matter. The Council has decided to press for an early meeting of representatives of the three Corporations.

Ipswich.—YEAR'S WORKING.—The report of the manager of the Corporation railless-car undertaking (Mr. A. S. Black) for the year ended March 31st last shows a total income of £63,410 and working expenses of £48,235, leaving a gross profit of £15,175. The preceding year's figures were:—Income, £56,663; working expenses, £43,945; gross profit, £12,718. To the gross profit was added revenue from other sources, making a total of £20,025. After deducting capital charges and appropriations for other purposes, there was a net surplus of £5,168, as compared with a deficit of £1,360 in 1927-28. The number of passengers carried increased from 10,248,078 to 11,313,791, and the car miles run from 1,082,147 to 1,210,444. The total revenue per car mile rose from 12.567d. to 12.573d.

London.—PICCADILLY CIRCUS STATION.—The old Piccadilly Circus station was closed to traffic on July 21st, and the new station now supports the full load of traffic at the interchange point. The old station with its eight lifts had been in service since December, 1907. It is hoped to form an arcade of shops on the site of the old booking office and lifts. Traffic at the new Piccadilly Circus station, which opened in December last, is now at the rate of 33,000,000 passengers annually and is still growing. The figures for the first six months show an increase of over 2,000,000 passengers.

NEW TICKET MACHINE.—The Underground Company has installed a new form of ticket-issuing machine at St. James' Park station. This embodies a unique feature—a "bunch hopper" as it is called—into which passengers can drop their coins indiscriminately without having to place them edgeways, and one at a time, into a slot. The machine is designed to issue 3d. tickets, and passengers may insert pennies or halfpennies. One hundred and fifty machines of this pattern are on order, and will be installed at other important underground stations in the near future.

United States.—RAILWAY ELECTRIFICATION.—The *Financial Times* reports that the Associated Gas and Electric System has entered into a long-term contract to supply the Delaware Lackawanna and Western Railroad with power for a portion of its lines which are to be electrified. The Lackawanna has undertaken the electrification of a part of the Morris and Essex division, extending from Hoboken to Dover, *via* Morristown; the Montclair branch from Roseville Avenue Station to Montclair; the Passaic and Delaware branch from Summit to Gladstone and that part of the Boonton line extending from Bergen Junction to Kingaland.

Telegraph and Telephone Notes.

Brazil.—WIRELESS INSTALLATIONS.—The Minister of Transport, through the Reparticao Geral dos Telegrafes, has authorised the erection and equipment of wireless stations for air transport services at Fernando Noronha, Natal, Recifé, Maceio, Bahia, Caravellas, Victoria, Santos, Florianopolis, Puerto Alegre and Pelotas. The Companhia Auxiliar Radio Emissora do Brazil has been instructed to prepare plans, specifications, and estimates at the earliest date, so that construction of the stations may be proceeded with without delay.—*Reuter's Trade Service* (Rio de Janeiro).

Canada.—BELL TELEPHONE CONSTRUCTION.—A total of $7,000,000 is to be expended by the Bell Telephone Co. on what is characterised as the largest single telephone construction job ever undertaken in Canada. Toronto is to be the centre of the project and 250 new long-distance lines are to be built throughout Ontario; 15,000 circuit miles will be added to the long-distance facilities of Ontario and Quebec, and the work will be completed before the end of the present year.

France.—RADIO-TELEPHONY.—The French Postmaster-General has tabled a Bill which will authorise the necessary credit for the construction of a radio-telephone system between France and Indo-China. It is proposed to erect the necessary apparatus at Pontoise, and *The Times* expects that the service will open in November.

Photo-telegraphy.—ANGLO-GERMAN SERVICE.—The Postmaster-General stated in the House of Commons last week that it had been decided to establish a public service between London and Berlin for the transmission by telegraphy of pictures, photographs, and other similar matter. It was hoped that the service would be opened within two or three months.

Radio-telephony.—ANGLO-ARGENTINE SERVICE.—The Postmaster-General announced that a limited telephone service was opened between London and Buenos Aires on July 22nd. The hours of service at the outset will be restricted to the period from 5.30 p.m. to 9 p.m. The charge for a call to Buenos Aires will be £6 9s. for the first three minutes and £2 3s. for each minute, or portion of a minute, thereafter.

Radio Notes.

Argentina.—STATION SITES.—The Government has published a decree prohibiting Argentine broadcasting stations being erected within city limits. Stations already constructed will be obliged to move outside within 9 months, dating from June 1st. Special provisions regarding wave-lengths and other changes in the immediate future have also been adopted, and a large amount of additional broadcasting equipment is expected to be required.—*Reuter's Trade Service* (Buenos Aires).

Egypt.—NEW STATION.—On July 17th the Marconi Co. concluded an agreement with the Egyptian Government to build a broadcasting station at Cairo.

Sweden.—LICENCES.—The number of wireless receiving licences issued in Sweden continues to rise steadily. During the past quarter of the year there was an increase of 11,445 and the total number at the end of June was over 412,000, or 67.5 per thousand inhabitants.—*Reuter's Trade Service* (Stockholm).

Television.—NEGOTIATIONS ENDED.—Negotiations between the B.B.C. and the Baird Television Development Co. for television transmission from broadcasting stations have been broken off, it is understood, by the company. The negotiations opened last March at the suggestion of the Postmaster-General in the last Government.

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the ELECTRICAL REVIEW containing the advertisement is given in parentheses below.

Contracts Open.

Australia.—MELBOURNE.—August 27th. Posts and Telegraphs Department. Cord-type switchboards. (B.X. 5428.)*
September 24th. Condensers. (B.X. 5488.)*
SYDNEY.—August 12th. Department of Public Works. Auxiliary hydro-electric generating plant for Burrinjuck. (A.X. 5365.)*

Belgium. — BRUSSELS. — July 31st. Post and Telegraph Authorities. Supply and erection at Ostend of one radio receiving set, one transmitting set, and four combined transmitting and receiving sets.
SAINT GILLES (BRUSSELS).—August 1st. Municipal Authorities. Supply of 2,550 metres of armoured cable of 600 sq. mm. section with two pilot wires for d.c. at less than 750 V; 3,550 kg. of bare hammered copper cable 300 sq. mm. section; 500 kg. of bare hammered copper wire 10 sq. mm. section; 250 junction boxes with copper connectors; and 900 connection boxes with copper connectors.

Canada.—Canadian National Railways. Power-driven shovels, with caterpillar traction. (A.X. 8230.)*

Cardiff.—August 8th. Union Guardians. Electric lighting and wiring installation and main distribution cables for Llandough Hospital. (See this issue.)

Chile.—SANTIAGO.—August 16th. Departments de Materiales y Almacenes, Chilean State Railways. Materials, including underground cable, train-lighting material, lamps, &c. (C. 3069.)* Telegraph and telephone material, including copper wire and cable, dynamometers, table telephones, telephone cords, &c. (C. 3072.)
August 9th (altered from July 12th). Ministry of Marine. Two aerial towers for the new wireless station at Arica. (A.X. 8134 and A. 8244.)*

Dundee.—July 30th. Corporation. Electric lighting installation at Fleming Trust housing scheme. Particulars from Mr. Geo. Baxter, director of housing.

Egypt.—CAIRO.—August 15th. Ministry of Interior. Diesel-engine alternator for the Zagazig power station. (B.X. 5393.)*
September 23rd. Electric lighting installation and distribution system for the town of Kafr-el-Cheikh (Gharbieh Province). (B.X. 5502.)*
October 1st. Tanzim Department. Ministry of Public Works. Electric lamp standards. (A.X. 8251.)*

Gloucester.—August 26th. Committee of Visitors. Electric wiring installation at the Wotton and Coney Hill Mental Hospital. (July 12th.)

India.—MADRAS.—August 13th. Madras and Southern Mahratta Railway Co., Ltd. 70 a.c. motors and starters for Perambur works remodelling, with spares for the motors and starters. (See this issue.)

London. — CENTRAL ELECTRICITY BOARD.—August 31st. Supply, delivery, and erection of 132,000-V outdoor switchgear for the Mid-East England Electricity Scheme, 1929. (July 19th.)
LONDON COUNTY COUNCIL.—August 12th. Supply and installation of nine 1,000-kW rotary convertors with static transformers. (July 19th.)
COMMISSIONERS OF H.M. WORKS.—August 13th. Ironclad unit-type switchgear at the National Physical Laboratory, Teddington. (See this issue.)
HACKNEY.—October 9th. Electricity Department. Three 125,000 normal 150,000 maximum lb.-per-hr. steam generating units, water-tube boilers, chain-grate stokers, &c. One 30,000-kW turbo-alternator, with exciter, &c. Fourteen 6,600-V, 3-phase, metal-clad, oil circuit-breaker equipments. (See this issue.)

Newcastle-under-Lyme.—August 24th. Installation of electric lighting in a new wing to be erected at the High School and Orme Girls' School. (July 5th.)

New Zealand.—GREYMOUTH.—August 27th. Grey Electric Power Board. Generating plant for the Arnold River Hydro-electric scheme. (B.X. 5422.)*
WELLINGTON.—Post and Telegraph Department. September 7th. V.i.r. wire. (B.X. 5416.)*
September 10th. Two-conductor cords. (B.X. 5462.)*
Public Works Department. October 15th. Seven 5,500-kVA single-phase auto-transformers and accessories for the Waitaki power scheme. (B.X. 5471.)*
AUCKLAND.—September 16th. Electric Power Board. Supply and delivery of two 500-kW machines and switchgear for Remuera sub-station; two 1,000-kW machines and switchgear for Point Chevalier sub-station; 22,000-V switchgear; 6,600-V switchgear; and supervisory control apparatus. (B.X. 5506.)*
INVERCARGILL.—September 23rd. Corporation. Supply and delivery of an 11,000-V, 3-phase, 50-cycle switchboard. (B.X. 5507.)*

Northern Ireland.—CARRICKMACROSS, Co. MONAGHAN.—Electric wiring installation at St. Joseph's Church (deposit £1 1s.). MacEntee & O'Kelly, consulting engineers, 23, Upper O'Connell Street, Dublin.

Portuguese East Africa.—LOURENCO MARQUES.—September 11th. Board of Port and Railways. Electric battery tractors and trailers. (A.X. 8172.)*

Salford.—August 10th. Electricity Department. L.p. paper-insulated, l.c. and armoured cables. (July 19th.)

Skipton.—July 31st. Electricity Department. Supply and delivery of 500 yd. of l.p. cable. (July 19th.)

South Africa.—PRETORIA.—Posts and Telegraphs Department. August 22nd. Telephone apparatus, including extension magneto bells, bell sets, terminal blocks, condensers, magneto generators, carbon protectors, magneto switch extensions, private branch exchange, central battery switchboards, tumbler switches, and wall and table telephones. (B.X. 5415.)*

BULAWAYO.—September 13th. Municipal Council. H.p. overhead transmission lines with accessories and stepdown transformers, pumps and motors with starters, pipework and float control gear. (A.X. 8181.)*

DURBAN.—September 27th. Corporation. Supply and delivery of three-phase ironclad compound-filled switch panels. (B.X. 5505.)*

Uruguay.—MONTEVIDEO.—August 17th. Posts, Telegraph and Telephones Administration. Telegraph wire. (A.X. 8229.)*

Uttoxeter.—August 12th. Urban District Council. Overhead 11,000-V transmission line. E.h.p. and l.p. cables and roadwork and public lighting. Sub-station equipment. (July 12th.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed.

Battersea.—Electricity Committee. Accepted:—
500-kVA transformer (£233).—British Electric Transformer Co., Ltd.

Bedford.—Rural Council.
Installing electric light at the Isolation Hospital.—Gollings and Ayres.

Bradford.—Electricity Committee. Recommended:—
Steam valve.—J. Blakeborough & Sons, Ltd.
Steel work for tank room at Valley Road power station.—Sutcliffe Bros.
Steel work for turbo alternator foundation.—Hall and Pickles, Ltd.
Erection of hotwell tank and one surge tank for boiler house.—Newton, Chambers & Co., Ltd.
Reorganisation of the e.h.p. switchgear at Valley Road power station.—A. Reyrolle & Co., Ltd.
Tramways Committee. Recommended:—
Rail file (£250), rail grinder (£330).—Equipment & Engineering Co., Ltd.

Burnley.—Electricity Committee. Accepted:—
Electric cable for the extension of an existing main from the Holmby Road sub-station (£3,300).—Macintosh Cable Co., Ltd.

Bury St. Edmunds.—Town Council. Accepted:—
Installing electrical heating apparatus in the Council Chamber.—Electricity Department.

Calne.—Town Council. Accepted:—
Underground cables for the supply to the new school in Silver Street, and wiring the municipal buildings.—Morement & Bridges.

Cape Town.—Electricity Committee. Recommended:—
500 ten-amp. meters.—Measurement, Ltd.
Brackets, fittings, &c., for street lighting extensions (£1,783).—South African General Electric Co., Ltd.
L.p. cable (£265).—British General Electric Co., Ltd.

Crewe.—Education Committee. Accepted:—
Installing electric lighting at Edleston Road schools.—Charlesworth & Whiston.

Croydon.—Tramways Committee. Recommended:—
Battery for tower wagon (£147).—D.P. Battery Co., Ltd.
Electricity Committee. Recommended:—
Switchboard for control at new factory (£814).—A. Reyrolle & Co., Ltd.
Boiler house and equipment (£101,712).—Babcock and Wilcox, Ltd.
Turbo-alternator, &c. (£76,851).—Metropolitan-Vickers Electrical Co., Ltd.
Switchgear (£44,227).—English Electric Co., Ltd.

Government Contracts.—The following Government contracts were placed during June, 1929:—

ADMIRALTY CONTRACT AND PURCHASE DEPARTMENT.
W./t. amplifiers.—H. W. Sullivan, Ltd.
Battery.—Chloride Electrical Storage Co., Ltd.
Turbine blading.—J. I. Thornycroft & Co., Ltd.
Electric pulley block.—Marshall, Fleming & Co., Ltd.
Electric cables.—British Insulated Cables, Ltd.; W. T. Glover & Co., Ltd.; Hackbridge Cable Co., Ltd.; St. Helens Cable & Rubber Co., Ltd.
Electric cranes.—Wharton Crane & Hoist Co., Ltd.; Marshall, Fleming & Co., Ltd.
Electro-mechanical firing gear.—A. Graham & Co., Ltd.
Oil-driven generating sets.—Mirrlees, Bickerton & Day, Ltd.
Switches, sockets, and plugs.—Edison Swan Electric Co., Ltd.
Power-driven winch.—Stothert & Pitt, Ltd.
Copper wire.—Concordia Electric Wire Co., Ltd.; Kent Bros. Electric Wire Co. & E. H. Phillips, Ltd.; Ward and Goldstone, Ltd.

WAR OFFICE.
Secondary portable cells.—Pritchett & Gold & E.P.S. Co., Ltd.
Variable condensers.—India-Rubber, Gutta-Percha & Telegraph Works Co., Ltd.
Electric desk and ceiling fans.—Metro-Vick Supplies, Ltd.
Switchboards.—Ferguson, Pailin, Ltd.
Rotary transformers.—Haslam & Newton, Ltd.

AIR MINISTRY.
Accumulators.—Fuller Accumulator Co. (1926), Ltd.; Peto and Radford, Ltd.; Oldham & Son, Ltd.
Ammeters.—Everett, Edgcumbe & Co., Ltd.
Electric cable.—General Electric Co., Ltd.
Condensers.—A. W. Hart & Co., Ltd.
Generators.—Haslam & Newton, Ltd.
Generator cases.—D. M. Davies (Holloway), Ltd.
Remote controls.—A. W. Hart & Co., Ltd.
Sound-signalling apparatus.—Broom & Wade, Ltd.
Sparking plugs.—K.L.G. Sparking Plugs, Ltd.
Switch boxes.—Park Royal Engineering Co., Ltd.; Plessey Co., Ltd.

POST OFFICE.
Fire-alarm apparatus.—Walter's Electrical Mfg. Co., Ltd.
Telephone apparatus.—Automatic Telephone Mfg. Co., Ltd.; Ericsson Telephones, Ltd.; General Electric Co., Ltd.; International Electric Co., Ltd.; Siemens Bros. & Co., Ltd.; Standard Telephones & Cables, Ltd.
Battery stores.—Alton Battery Co., Ltd.; Edison Swan Electric Co., Ltd.; Fuller Accumulator Co. (1926), Ltd.; General Electric Co., Ltd.; India-Rubber, Gutta-Percha & Telegraph Works Co., Ltd.; Siemens Bros. & Co., Ltd.; C. A. Vandervell & Co., Ltd.
Cable.—Connollys (Blackley), Ltd.; Enfield Cable Works, Ltd.; General Electric Co., Ltd.; W. T. Glover and Co., Ltd.; Hackbridge Cable Co., Ltd.; W. T. Henley's Telegraph Works Co., Ltd.; Johnson & Phillips, Ltd.; Macintosh Cable Co., Ltd.; Pirelli-General Cable Works, Ltd.; Standard Telephones & Cables, Ltd.; Telegraph Construction & Maintenance Co., Ltd.
Joint-box castings.—United Steel Companies, Ltd. (Thos. Butlin & Co. branch).
Earth clips.—E. Showell & Sons, Ltd.
Loading coils.—Standard Telephones & Cables, Ltd.
Cords for telephones.—Reliance Electrical Wire Co.
Ducts.—Albion Clay Co., Ltd.; Donington Sanitary Pipe and Firebrick Co., Ltd.; Doulton & Co., Ltd.; Jas. Oakes & Co. (Riddings Collieries), Ltd.; Standard Brick & Terra Cotta Co., Ltd.
Motor generators.—Electric Construction Co., Ltd.
Insulators.—Thos. De la Rue & Co., Ltd.; Litholite Insulators, Ltd.; C. W. Outram & Co., Ltd.
Telegraphic ironwork.—B. Berks & Co.; J. Hill & Sons; T. W. Lench, Ltd.; D. Willetts, Ltd.
Wireless valves.—General Electric Co., Ltd.; Standard Telephones & Cables, Ltd.
Annealed copper wire.—Elliotts Metal Co., Ltd.
Enamelled copper wire.—Connollys (Blackley), Ltd.
Silk-covered copper wire.—Concordia Electric Wire Co., Ltd.
Rubber-covered copper wire.—Enfield Cable Works.
Switchboard wire.—General Electric Co., Ltd.
Electric lift, Liverpool (Bank) Telephone Exchange.—Pickerings, Ltd.
Electric lighting and power wiring Macaulay Automatic Exchange.—A. Hawkins & Sons, Ltd.
Telephone exchange equipment.—Hazell, Watson and Viney, Ltd. (London, W.C.).: Relay Automatic Telephone Co., Ltd. Central (Birmingham), East (Birmingham), Bearwood (Birmingham), Farnborough, Maryland, Clissold, and East (London, E.): Automatic Telephone Mfg. Co., Ltd. Granton (Edinburgh): Siemens Bros. & Co., Ltd. Sub-contractors: English Electric Co., Ltd., for charging machine; Crompton Parkinson, Ltd., for ringing machine; Hart Accumulator Co., Ltd., for batteries. Dorchester: Siemens Bros. & Co., Ltd. Boscombe: General Electric Co., Ltd. Sub-contractors: Crompton Parkinson, Ltd., for motor generator and ringing machines; D.P. Battery Co., Ltd., for batteries.

CROWN AGENTS FOR THE COLONIES.
Battery materials.—General Electric Co., Ltd.
Meters.—Ferranti, Ltd.
Telegraph materials.—Shropshire Iron Co., Ltd.; Siemens Bros. & Co., Ltd.
Telephone cable.—W. T. Henley's Telegraph Works Co., Ltd.

Telephone materials.—Ericsson Telephones, Ltd.
Train-lighting spares.—J. Stone & Co., Ltd.
Transformers.—Brush Electrical Engineering Co., Ltd.

H.M. OFFICE OF WORKS.

Cables, National Physical Laboratory.—Siemens Bros. and Co., Ltd.

Hertford.—Town Council. Accepted:—
Additions to the electric lighting installation at the Corn Exchange (£284).—Thomas J. Digby Illuminating Engineering Co., Ltd.

London.—LONDON COUNTY COUNCIL.—Highways Committee. Accepted:—
Controller segments (£189).—Yorkshire Switchgear and Engineering Co., Ltd.
500 standard driving wheel centres.—John Baker & Co. (Rotherham), Ltd.
Gear wheels and pinions (£1,626).—David Brown & Sons (Huddersfield), Ltd.
Four tower wagon batteries.—D.P. Battery Co., Ltd.

HAMMERSMITH.—Electricity Committee.
Relining underground flue of boilers (£506).—Fraser and Fraser, Ltd.
3,500 yd. cable in connection with the supply of electricity to the Olympia extension (£3,731).—Standard Telephones & Cables, Ltd.
Switchgear for Olympia extension (£3,002).—A. Reyrolle and Co., Ltd.

KENSINGTON.—Libraries Committee. Recommended:—
Re-wiring Leighton House (£312).—Duncan, Watson and Co.

METROPOLITAN WATER BOARD.—Recommended:—
Provision of Parsons-Sloper secret interphones, &c., at head offices:—

BARLOW BROS. & Co. (Recommended)	£270
Duncan Watson & Co.	271
Troughton & Young, Ltd.	309
A. Dean & Co., Ltd.	384
Girdlestone & Co.	485

Electric lamps. Accepted:—
Vacuum and gasfilled types.—General Electric Co., Ltd.
Vacuum traction type.—Siemens Electric Lamps and Supplies, Ltd.

METROPOLITAN ASYLUMS BOARD.—Wireless installation at Princess Mary's Hospital for Children:—

REED, S., & Sons (Recommended)	£246
Tate, L. G., & Co., Ltd.	293
Holbrook & Tattersall, Ltd.	315
Estall, H., ...	330
Bunt, C. L.	342
Harvey, C., & Co.	350
Marconiphone Co., Ltd.	380

ST. PANCRAS.—Contracts and Stores Committee.
Supply of 15,540 yd. of various sizes of cable:—

SIEMENS BROS. & Co., LTD. (Recommended) ...	£7,934
Hackbridge Cable Co., Ltd.	8,084
Pirelli-General Cable Works, Ltd.	8,123
British Insulated Cables, Ltd.	8,132
Standard Telephones & Cables, Ltd.	8,214
Croydon Cable Works, Ltd.	9,065

Manchester.—Electrification of the Manchester to Altrincham line.
According to the *Daily Dispatch* three contracts totalling over £200,000 have been placed in connection with the electrification of the above line: for rotary convertors with the British Thomson-Houston Co., Ltd.; for the overhead equipment with Callender's Cable and Construction Co., Ltd.; and for the electrical equipment of the coaches with the General Electric Co., Ltd.

Oxford.—
Installing electric lighting at the Bodleian Library.—Hill, Upton & Co.

Seaham Harbour.—Electricity Committee. Accepted:—
Extension of lighting cables to Carr House Estate (£966).—J. E. Favell & Co.

Skelton and Brotton.—Urban Council. Accepted:—
Installing electric lighting at the Hospital.—Mr. Hewling.

Southend-on-Sea.—Town Council. Accepted:—
500 joint boxes (£266).—W. Lucy, Ltd.
Tramway signalling apparatus for pier (£960).—Westinghouse Brake and Saxby Signal Co., Ltd.
1,500-kW motor generator (£5,483).—General Electric Co., Ltd.
Extension of lighting cables to Carr House estate (£966).—

Stirlingshire.—County Council. Accepted:—
Installation of public electric lighting at Cowie, Fallin, and East Plean (£590).—J. & J. Duff.

Taunton.—Town Council. Accepted:—
36-in. cast-iron circulating-water discharge pipe from the generating station to the River Tone (£2,873).—George Pollard & Co., Ltd.

Forthcoming Event.

Institution of Electrical Engineers (London Students' Section).—August 3rd-13th. Summer tour in Paris and Northern France.

Notes.

E.P.E.A. Visit.

On July 6th members of the London Group of the Electrical Power Engineers' Association visited, as part of the programme of a more comprehensive outing, the works of the Hackbridge Electric Construction Co., Ltd., at Walton-on-Thames. Among the many items of interest seen were a number of mercury-rectifier sub-station installations, including a 2,000-kVA rectifier equipment (16 bulbs) to feed into a 480-V d.c. network from a 6,600-V, 3-phase, 50-cycle supply, for the Shoreditch Electricity Department. Various lift rectifier equipments, of 2-, 4-, 5-, 10-, and 15-h.p. capacity, for Messrs. Waygood-Otis, Ltd., Express Lift Co., Ltd., and other lift makers, and also some equipments for charging batteries for the Commodore Theatre and some for feeding projection arcs for the Dominion Theatre, were also seen. In addition, the visitors inspected a large number of transformers in various stages of construction, including some large 2/12-phase units for West Ham for operation in conjunction with a bank of Hewittic rectifiers, three 4,000-kVA, 3-phase, 25-cycle units for Birmingham Corporation, and the completed windings of some of the 45,000-kVA, three-phase transformers which are being built for the Central Electricity Board's "grid scheme."

Appointments Vacant.

Two junior assistant engineers for Wallasey Corporation. Distribution assistant for Great Yarmouth Corporation. Draughtsmen and distribution engineering assistants for the Shanghai Power Co. Draughtsman for Salford Corporation. Technical officer for the Royal Aircraft Establishment, South Farnborough. Shift engineer for Manchester Corporation. Two telephone line foremen for the Shanghai Mutual Telephone Co., Ltd. Commercial assistant for Bromley Corporation Electricity Department. Electrical engineer for the Nigerian Public Works Department. (See our advertisement pages to-day.)

Electricity Supply in Rural Areas.

On July 16th, 1929, the Electricity Commissioners convened a further meeting of the Conference on Electricity Supply in Rural Areas, which was attended by twenty-two representatives of Government Departments and of various associations and other bodies interested in the various aspects of rural electrification. The main purpose of the meeting was to consider the action which had been taken on the various recommendations embodied in the report of their proceedings published by the Commissioners (through H.M. Stationery Office) in July, 1928. A summary of the action taken on the matters dealt with since June, 1928, was considered, together with documents relating to various aspects of electricity supply in rural areas which had been furnished by, or through the medium of, the Ministry of Agriculture and Fisheries, the Department of Agriculture for Scotland, &c. It was noted that various important schemes for the development of supply in different parts of the country under Electricity Acts and Orders had been, or were about to be, approved by the Electricity Commissioners; that the Commissioners, with the concurrence of the Minister of Transport, had appointed a technical officer whose duties would be specially concerned with the fostering of rural electrification, and that the Commissioners had appointed committees which were at present investigating the questions of uniformity of electricity charges and tariffs, and the provision of facilities for assisted wiring and the hire and/or hire-purchase of electrical apparatus to prospective consumers; both matters being of special importance in connection with the development of rural supplies. A further meeting of the conference is to be convened as soon as the reports of the above-mentioned committees have been received; and consideration will then be given to the question of publishing a further report of the proceedings of the Conference.

Legal.

EDISON ACCUMULATORS, LTD., *v.* EDISON STORAGE BATTERIES, LTD.—In the Court of Appeal, consisting of the Master of the Rolls and Lords Justices Lawrence and Slesser, on July 22nd, Edison Storage Batteries, Ltd., appealed from a judgment of Mr. Justice Clauson in the Chancery Division granting an interlocutory injunction restraining the company from carrying on business under its present name or any name calculated to lead to confusion between the company and the plaintiffs in the action, Edison Accumulators, Ltd.

The appellant company is an English concern which was promoted by an American company of the same name. In 1913 an agreement was entered into between the American company and Edison Accumulators, Ltd., plaintiffs' predecessors in title, when the American company had a number of patents in this country for protecting the manufacture of its accumulators. Those patents had since expired, and plain-

tiffs alleged that the effect of that agreement was to give their predecessors sole selling rights of Edison accumulators, except sales to Governments. That agreement continued in force until March, 1925, when it was replaced by another agreement for a period of five years with a provision for 90 days' notice to terminate in the event of any breach. In January, 1929, the original Edison Accumulators company split itself into two companies—Britannia Batteries, Ltd., and Edison Accumulators, Ltd., the latter company having the benefit of the agreement of March, 1925. On March 19th last the plaintiff company received from the solicitors to the American company notice purporting to terminate the agreement on the ground that there had been breaches. On April 8th, 1929, the defendant company was registered as a private company to carry on the business of, amongst other things, selling accumulators in this country. The plaintiffs denied that there had been any breaches, and contended that in the circumstances the defendants could not carry on business under a name which so closely resembled theirs, and that there was bound to be confusion. The defendants denied that there would be confusion. They contended that their name was descriptive of goods which were sold, and the mere use of an honest description of goods could not be stopped.

Mr. Justice CLAUSON held that it would be impossible for the defendants to trade under their present name without causing confusion. He, however, suspended the operation of the injunction pending the present appeal.

Sir DUNCAN KERLY, K.C., said that Mr. Justice Clauson had refused to consider the following matters which he (counsel) considered necessary: Whether the plaintiffs had any right to the exclusive use of their name; how or why they had acquired that name; whether the defendants' name was descriptive of the goods which they sold and which they were entitled to use; and whether the adoption of the plaintiffs' name was part of a scheme which, counsel submitted, was unquestionably a deliberate breach of contract. The defendants took the view that the plaintiffs had no right to trade under their signatory name. In any event it was not a case for granting an interlocutory injunction.

Without calling upon counsel for the respondents, their Lordships dismissed the appeal. In giving judgment, the MASTER OF THE ROLLS said that no doubt the injunction which had been granted was of considerable importance to the appellants. But the fact was that Mr. Justice Clauson, who had the whole matter before him, had decided that it was not right to leave the question to be decided *in medio* at the present stage, and he (the Master of the Rolls) did not see his way to overrule the decision.

The other members of the Court concurred, and the appeal was accordingly dismissed with costs.

Ashridge House.

With reference to the description of the electrical installation of the above-named mansion (see our July 19th issue, pp. 99-101), we are asked by Messrs. Drake and Gorham, Ltd., to state that the switchgear gear they supplied to the Chesham Electric Light and Power Co., Ltd., for installation in the transformer sub-station consisted of a 6,600-volt main switchboard made up of four "Metesco" e.h.p. oil switch-fuses, two for the ring-main feeders and two for the two transformers, with metering equipment in between. It is one of a number of similar equipments the company has supplied from time to time.

Mining Engineers' Visit.

On July 5th, members of the Association of Mining Electrical Engineers visited Seghill Colliery. The colliery is all-electric and provides a load of some 4,000 h.p. The supply is received from the Newcastle-upon-Tyne Electric Supply Co., Ltd., at 20,000 V.

Educational.

UNIVERSITY OF BIRMINGHAM ELECTRICAL ENGINEERING DEPARTMENT.—The 1928-29 session commences on September 30th. Detailed syllabus with full particulars of University regulations, lecture and laboratory courses, fees, &c., can be obtained from the Registrar. (See our advertisement pages to-day.)

The Ayrshire Electricity Board.

New administrative buildings erected by the Ayrshire Electricity Board in Kilmarnock were formally opened on July 19th by Sir Andrew Duncan, chairman of the Central Electricity Board.

The ceremony was presided over by ex-Provost Mathew Smith, Kilmarnock, chairman of the Ayrshire Electricity Board, and there were present representatives of all the municipalities served by the Board and of many of the larger industrial undertakings which it supplies. An extension of the boiler house was also inaugurated by Mr. Archibald Page, chief engineer to the Central Electricity Board. After inspecting the new buildings and boiler house, the company had luncheon in the Art Galleries.

Sir Andrew Duncan, in toasting "The Ayrshire Electricity Board," spoke of the interest taken by the Central Board in the work of the Ayrshire body, and said the real aim of all interested in electricity should be to reduce costs. In Ayrshire they had attempted to solve the problem by arriving at a territorial unit for electrical development, different from almost any other county in the country. Since 1924 they had been engaged in an experiment which was of first-class importance to the whole country; they were carrying on a task which in a few years would become one of the dominant issues in the electrical development of the country. No one could believe that the present distribution areas on the average were wisely designed. In Ayrshire they had overcome local jealousies between town and town. There were two angles from which every undertaking must review the position and take stock. The first was that of price: relating the price, not to the present trade, but to the trade that would inevitably come if the price were kept low. That required courage, but there was no country that had not faced that problem in its own affairs. The second was the extent to which electrical undertakings were going to carry the capital cost, not only of producing power and distributing it throughout the country, but also of taking it to the house and the factory. It seemed impossible to him to make much further development on the domestic side unless electricity supply authorities undertook to instal electricity in homes at their own cost, leaving the people simply to pay a hire rent. He did not believe the people in this country were in a position to finance installations costing up to £50 or £100, particularly in houses that were not their own.

Ex-Provost Smith, responding, assured Sir Andrew that when the Central Board could supply them with electricity at less than the Aryshire Board could produce it they would be willing customers. Referring to rural electrification, Mr. Smith was hopeful that they might get some help from central funds, which would enable them to tackle problems that under ordinary cidcumstances they would not be able to do without touching the finances of the general ratepayer.

Sir Alexander Walker proposed the toast of "The Central Electricity Board."

Mr. Archibald Page, in reply, said that first and foremost the work of the Central Electricity Board was to construct about 3,000 miles of transmission lines. In the process up to date they had placed contracts which aggregated something like £19,000,000, which was a big contribution to the business side of the manufacturing section of the industry.

Presentations were made to Bailie David Orr, J.P., Kilmarnock, convener of the Engineering Committee, and Police Judge Andrew M. Hunter, Ayr, convener of the Finance Committee, on behalf of the contractors engaged in the building of the administrative offices, and to ex-Provost Smith by the contractors engaged in the boiler-house extension.

A Large Steam Turbine for Paris.

The Société d'Electricité de Paris has ordered from the Oerlikon Company for the extension of its St. Denis power station a 75,000-h.p. high-pressure steam turbine, which marks a most important advance in steam-turbine design. In fact, it will probably be the first instance of the generation of such high power in a multi-cylinder set arranged on one shaft and running throughout at the speed of 3,000 r.p.m. Of all the competing firms, the Oerlikon Company alone favoured from the outset the arrangement described. The set will consist of a high-pressure element, a medium-pressure element, and two low-pressure cylinders coupled direct to one alternator and an exciter, all mounted in line on a single shaft. During normal working conditions, the steam pressure (measured immediately in front of the turbine) will amount to from 710 to 850 lb. per sq. in. (abs.), while the steam temperature will be from 842 to 900 deg. F. In exceptional cases, the turbine must be capable of withstanding a pressure of 995 lb. per sq. in. and a temperature of 932 deg. F. The new turbine will thus be built for steam pressures which have hardly ever been used so far in conjunction with such high temperatures. In accordance with the present-day trend with regard to the improvement of thermal efficiency, the installation will be provided on a very extensive scale with plant for distilling, de-aerating, and pre-heating the boiler-feed water. The turbines will be coupled direct to a three-phase generator running at 3,000 r.p.m., which will develop a continuous output of 50,000 kW at a power factor of 0.7 and a pressure of 10,500 volts.

Transfer of Hereford Undertaking.

At a meeting of Hereford City Council on July 16th it was decided to transfer the whole of its electricity undertaking to the Shropshire, Worcestershire and Staffordshire Electric Power Co. In moving the adoption of the proposal, the chairman of the Electricity Committee stated that the loss on the rural area was likely to absorb the profits in the city area for some years to come. If the transfer did not take place it would be necessary within the next five years to draw from the ratepayers a sum of not less than £18,000, in addition to a sum of £25,000 which the Committee had already paid out, and that in spite of the fact that new income-earning expenditure of from £20,000 to £25,000 would have been incurred. It was impossible to dispose of the rural scheme alone. The most important provision was that the company offered to take over the responsibility for all the Committee's liabilities in respect of loans amounting to £189,000 as from March, 1928, and all the instalments and interest after 1929. After disposing of all liabilities, there should remain a cash balance of £10,000. The company would take over all regular employés, and extend to them the Company's superannuation scheme. It had also undertaken that the prices charged for electricity in Hereford should be identical with those prevailing in Kidderminster. Mr. J. H. Rider, consulting engineer, was of opinion that the consumers in the city area would be as well off as before, and those in the rural area better off.

The Shannon Scheme.

The Times reports that at O'Brien's Bridge, near Limerick, on July 22nd, Mr. Cosgrave, President of the Executive Council of the Irish Free State, opened the sluices leading to the head-race of the Shannon scheme, allowing a certain amount of Shannon water to enter the canal. Water had been pumped into the canal beforehand, but in order that the embankments might be thoroughly tested, several inches of water from the river were poured into the headrace. A large and representative company accompanied Mr. Cosgrave to Limerick. Before the sluices were opened the canal was blessed by the Roman Catholic Bishop of Killaloe. A considerable amount of work remains to be done before electricity can be produced from the Shannon. The 9½ miles of embankments must be carefully tested before the turbines can be set in motion, and the water from the river will be introduced by easy stages.

The Bussey Coal Distillation Works.

On Friday last some 150 guests of the chairman of the Bussey Coal Distillation Co. (Mr. Aubrey Powell) travelled by two private sleeper trains to Glenboig to inspect the low-temperature carbonisation works and witness the formal starting of the plant. To this party was added a number of Scottish residents, who came by motor vehicles. The plant consists of 14 retorts with a total daily throughput of 600 tons of bituminous coal, a series of 3-hour processes resulting in the production of 400 tons of smokeless fuel, 15,000,000 cu. ft. of gas (c.v. 250 B.th.u. per cu. ft.), and 20,000 gallons of crude oil. It is claimed that the value of the raw coal is increased by 40 per cent. Each retort consists of a cone-shaped steel stack lined with fire-brick. The retort chamber is automatically kept filled and the carbon residue, when discharged from the base, travels on a belt conveyor to the screens. The gases and oils are removed from the top by turbine exhausters and are first passed through a Lodge-Cottrell 100,000-volt electro-static separator, wherein 90 per cent. of the oil is removed in a crude form. They then go to a surface condenser, wherein a further 9 per cent. of the oil is extracted; the residue of 1 per cent. (motor spirit) is remoevd in a washer cooler. Some of the gas is used for firing the boilers used in connection with the blowers, exhausters, and pumps, the remainder being supplied to the Glenboig Union Fireclay Co. for firing its brick kilns. The electric power required for the works is at present supplied by the Clyde Valley Electric Power Co. through a 200-kW, 25/50-cycle frequency changer, but an interesting proposal of the company is to install a Diesel engine (now on order) of 200-kW capacity to run at the high speed of 750 r.p.m. A 500-kW gas-engine set is also to be installed. The Lodge-Cottrell precipitator plant is driven by a 4-h.p. motor (1,500 r.p.m.).

The frequency changer, main and distribution switchgear, motor-generators for laboratory use, and motors for oil and water-pumping duties are of Messrs. Crompton Parkinson's manufacture, as are also the motors which operate the retorts. The latter are controlled as to speed by heat variation in the process; the conditions are severe, as the motors (with inner shells totally-enclosed and forced-draught cooled) are exposed to the weather on one side and to the high retort temperature on the other.

It is not the present intention of the company to generate electricity, apart from that required for its own purposes, but the situation of the works near the "grid," one tower of which can be seen in the distance, suggests an alternative use for its products.

In his speech at the inauguration ceremony, the chairman said that the Glenboig works constituted the largest low-temperature bituminous coal distillation plant in the world, and that the company was quite satisfied as to the market for its products.

Lord Elmley, M.P., in the absence of the Rt. Hon. J. R. Clynes, P.C., M.P. (Secretary of State for Home Affairs), who was detained in London on official business, switched on the current and declared the works to be formally started.

The return private train left Glenboig at 11.30 a.m. After luncheon on the train, speeches were made and broadcast to the several compartments, where perfect reception was obtained. After the loyal toast had been proposed by the chairman, the toast of "Prosperity to the new Bussey Glenboig Works" was proposed by Lord Elmley, and seconded by Major Gwilym Lloyd George, M.P. Sir W. Arbuthnot Lane, Bart., M.S., also spoke with special reference to the effects of atmospheric pollution. The chairman, in reply, stated that his company contemplated the erection of a further 20 similar plants in Great Britain, at a cost of £3,000,000, which would find employment, directly and indirectly, for 50,000 men. Last year we paid £45,000,000 for oil imports. We also used 40,000,000 tons of coal for domestic purposes, which wasted £27,000,000 in polluting the atmosphere. From that coal 800,000,000 gallons of crude oil could have been extracted, which, when refined, would have equalled in value more than half of the imported petrol. From the gas produced by the Bussey process he claimed that electricity could be produced more cheaply than from water-power in Great Britain. Three kinema performances in both of the theatres attached to the train took place during the afternoon, showing, among other things, the sequence of operations at the Glenboig works. The train reached Euston at 7.30 p.m. after the longest non-stop run (395½ miles) ever made from Scotland to England. Hospitality was offered throughout on a lavish scale, and no pains were spared to ensure the comfort of the guests.

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.

We learn that the successor to Mr. F. W. Purse as borough electrical engineer of West Ham is to be Mr. J. W. J. TOWNLEY, chief electrical engineer of the L.C.C. Tramways. Mr. Townley was appointed to his present position in 1926 upon the resignation of Mr. P. L. Riviere.

The Hammersmith Borough Council, at its meeting on July 17th, selected Mr. R. H. PATERSON, the chief assistant engineer, to fill the position of borough electrical engineer at a salary of £1,200 to £1,400 per annum. This post has been vacant since February last in consequence of the death of Mr. F. Hill. Mr. Paterson has been with the Hammersmith Council for about 27 years. Prior to this he was at the Dewar Place generating station in Edinburgh.

Mr. J. K. GRANT, assistant engineer and manager to the Ascot District Gas and Electricity Co., Ltd., has been appointed engineer and manager to the Horley District Gas Co.

The Southend-on-Sea Town Council has appointed Mr. J. T. LEES overhead line superintendent of the tramways, at a salary of £270 per annum, rising to £300.

Dr. Ing. P. ANDROMESCU was recently appointed Director-General of the Rumanian Posts, Telegraphs and Telephones.

M. HOFKER, Chief Inspector of the Dutch Telegraphs, has recently retired after 49 years of service.

Mr. W. ELLERD-STYLES, M.I.E.E., whose paper on "Large Electric Baking Ovens" was read before the Institution of Electrical Engineers in 1928, has been awarded the gold insignia of the Grand Order of the London Baking Trade. Only four awards of this distinction have been made, and its bestowal upon Mr. Ellerd-Styles is a compliment to the electrical engineering profession.

Mr. J. E. FAVELL, who is well known in the Tyne and Tees area, has been appointed director of sales and publicity to the Revo Electric Co., Ltd. He commences his new duties on August 1st.

Consequent upon the death of Mr. C. R. C. HART, Mr. ARTHUR E. DOWNER, F.S.A.A. (who has been a director of the company for 15 years), has been appointed chairman and managing director of the Dermatine Co., Ltd., and Mr. W. E. DOWNER has been elected a director.

Mr. J. T. RYMER has resigned his position as sales manager and chief engineer of the electric lighting and pumping departments of Messrs. R. A. Lister & Co., Ltd., to join the board of Messrs. Stuart Turner, Ltd.

The marriage took place recently at Batley Carr of Mr. E. R. ROBERTS, of the Yorkshire Electric Power Co., and Miss EVELYN PICKERING, of Dewsbury, who has also been on the staff of the company. The staff presented them with an alabaster bowl fitting, and a mahogany clock.

Obituary.—ALDERMAN W. SCHOLES.—The death occurred last week of Alderman Walter Scholes, of Ashton, who was a director of the National Gas Engine Co., Ltd., and was connected with Ruston & Hornsby, Ltd.

MRS. B. HANDLEY.—We regret to learn that Mrs. B. Handley, the wife of the Portsmouth city electrical engineer, passed away on July 10th. The funeral took place at Milton Cemetery on July 13th.

MR. C. BENYON.—The death is announced, at the age of 52 years, of Mr. Charles Benyon, who had for many years been in business as an electrical engineer at Dukinfield.

BARON EMPAIN.—The death is reported from Brussels, at the age of 77, of Baron Empain, an electrical engineer and financier, who was responsible for the first plans of the Paris "Metro."

Wills.—The late Mr. EDWARD GURNEY BUXTON, who was a director of Callender's Cable & Construction Co., Ltd., and the Anchor Cable Co., Ltd., left estate valued at £233,803 (£208,200 net personalty).

The late Mr. ALFRED GRAHAM, of Forest Hill, S.E., left estate to the value of £50,248 gross and £48,411 net personalty.

Financial Section.

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Results, Transactions in Stocks and Shares.

New Companies Registered.

Gisburn Motor and Lighting Co., Ltd.—Private company. Registered July 11th. Capital, £500 in £1 shares. Objects: To acquire the business of a motor engineer, garage proprietor and producer and distributor of electricity at Gisburn, West Riding. The directors are: G. Cornall, "Oaklands," Gisburn, motor mechanic; J. Hanson, "Holme View," Barrowford, commercial traveller; P. Sharp, Gisburn Road, Barrowford, motor mechanic; H. Hirst, 46, Hargreaves Street, Nelson, coal merchant. Secretary: J. Hanson. Registered office: Ribblesdale Garage, Gisburn.

Kenneth E. Beswick, Ltd.—Private company. Registered July 15th. Capital, £1,500 in £1 shares. Objects: To acquire the business of a manufacturer of components appertaining to the electrical and mechanical trades heretofore carried on by K. E. Beswick at Seven Kings, Essex. The directors are: Margery A. Beswick, The Croft, Emerson Park, Hornchurch (both permanent, subject to each holding 100 shares). Registered office: Alert Works, Durban Road, Seven Kings, Essex.

Electric Sharpeners, Ltd.—Private company. Registered July 15th. Capital, £7,500 in 5s. shares. Objects: To carry on the business of manufacturers, importers and exporters, contractors for the sale, installation and maintenance of plant, and machines of all kinds; contractors for the sharpening of blades, knives, razors and other implements; electricians, electrical and mechanical engineers, &c. The directors are: Col. B. H. O. Armstrong, C.B., C.M.G., 2083, Union Avenue, Montreal, Canada, and 6, Walpole Gardens, Twickenham; Sir Logie Elphinstone, Bt., 40, Kildare Terrace, W.2. Registered office: Balfour House, Finsbury Pavement, E.C.2.

Central Wireless Co., Ltd.—Private company. Registered July 15th. Capital, £200 in 100 7 per cent. preference shares of £1 each and 2,000 ordinary shares of 1s. each. Objects: To carry on the business of manufacturers and distributors of and dealers in wireless, television, and radio apparatus of all kinds, &c. The subscribers (each with one ordinary share) are: C. Morgan, 24, St. Paul's Avenue, Willesden Green, N.W., wireless manufacturer; C. J. Dykes, 38, Wilson Road, W. Kensington, W.14, company secretary. The first directors are to be appointed by the subscribers. Secretary: C. J. Dykes, 21, Farringdon Avenue, E.C.

G. D. Hall, Ltd.—Private company. Registered July 15th. Capital, £1,000 in £1 shares. Objects: To carry on the business of electrical and radio engineers and manufacturers, dealers in mechanical, electrical, and wireless instruments and apparatus, &c. The directors are: G. D. Hall, 16, Belmont Avenue, Blackpool; R. W. Smith, 16, Belmont Avenue, Blackpool; P. Counsel, "Monrovia," Bispham Road, Blackpool. Secretary: R. W. Smith. Registered office: 4, St. John's Walk, Church Street, Blackpool.

Magneto, Dynamo & Car Repair Works, Ltd.—Private company. Registered in Edinburgh, July 13th. Capital, £500 in £1 shares. Objects: To carry on the business of selling and repairing magnetos, dynamos, and motor cars and accessories, &c. The directors are: W. Whitfield, 200, St. George's Road, Glasgow, electrical engineer; J. B. McHoul, 357, Pollokshaws Road, Glasgow, engineer. Secretary: J. B. McHoul. Registered office: 14½, Douglas Street, Glasgow.

Hadrian Manufacturing Co,, Ltd.—Private company. Registered July 15th. Capital, £500 in £1 shares. Objects:—To carry on the business of manufacturers of, agents for, and dealers in radio instruments, amplifiers, sound producers and reproducers, &c. The subscribers (each with one share) are:—N. Miller, "Lyndhurst," Runnymede Road, Ponteland, Northumberland, engineer; G. E. Bowman, "Glengariff," Fawdon Lane, Gosforth, Newcastle-on-Tyne, wireless engineer. The first directors are to be appointed by the subscribers. Solicitors: William Francis & Co., 5, St. Mary's Place, Newcastle-on-Tyne.

Blundell-Curtis, Ltd.—Private company. Registered July 20th. Capital, £100 in £1 shares. Objects:—To carry on the business of manufacturers, importers and exporters of, agents for, and dealers in all kinds of electrical and other instruments, appliances, materials, supplies and components in connection with wireless-telegraphy, &c. The directors are:—L. Blundell (permanent governing director and chairman), "Hillside," Prestwich Park, Manchester; W. H. Curtis, 278, New Cross Road, S.E.14. Solicitor: M. Blumberg, 31, Princess Street, Manchester.

Official Returns of Electrical Companies.

Fitt Bros. & Davies (1924), Ltd.—Issue on July 5th, 1929, of £400 debentures, part of a series already registered.

Peacehaven Electric Light and Power Co., Ltd.—Capital, £20,000 in 15,000 preference shares of £1 each and 20,000 ordinary shares of 5s. each. Return dated January 29th, 1929. 13,883 preference and 16,027 ordinary shares taken up. £17,928 13s. 1d. paid, including £38 18s. 1d. paid on forfeited shares. Mortgages and charges, nil.

Giljay, Ltd.—Capital, £1,000 in £1 shares. Return dated April 19th, 1928 (filed March 30th, 1929). 975 shares taken up. £801 paid, £174 considered as paid. Mortgages and charges, nil.

Vac-Tric, Ltd.—Capital, £4,000 in 202 "A" shares of 10s. each and 3,899 "B" shares of £1 each. Return dated December 31st, 1928 (filed April 19th, 1929). 202 "A" and 1,903 "B" shares taken up. £2,004 paid. Mortgages and charges, nil.

Consolidated Signal Co., Ltd.—Capital, £425,000 in 220,000 preference and 205,000 ordinary shares of £1 each. Return dated January 31st, 1929. 214,195 preference and 150,548 ordinary shares taken up. £52,839 paid on 24,999 preference and 27,840 ordinary shares, £311,904 considered as paid on 189,196 preference and 122,706 ordinary shares. Mortgages and charges, nil.

British Radio Corporation, Ltd.—Capital, £2,000 in 1,000 preference and 1,000 ordinary shares of £1 each. Return dated April 4th, 1929. All shares taken up. £1,780 paid on 1,000 preference and 780 ordinary shares, £220 considered as paid on 220 ordinary shares. Mortgages and charges, nil.

E. S. White & Co., Ltd.—Capital, £2,000 in 1,000 preference and 1,000 ordinary shares of £1 each. Return dated June 12th, 1928 (filed April 18th, 1929). 600 preference and 500 ordinary shares taken up. £104 paid, £996 considered as paid. Mortgages and charges: £2,000.

Radiocraft Supplies, Ltd.—Capital, £3,500 in £1 shares. Return dated April 17th, 1928 (filed February 13th, 1929). 2,502 shares taken up. £752 paid, £1,750 considered as paid. Mortgages and charges: £500.

Oldham Electrical Contractors, Ltd.—Capital, £1,000 in £1 shares. Return dated June 11th, 1928 (filed March 16th, 1929). 503 shares taken up. £203 paid, £300 considered as paid. Mortgages and charges, nil.

Robert W. Blackwell & Co., Ltd.—Capital, £50,000 in £1 shares. Return dated January 14th, 1929. All shares taken up. £18,338 paid. £31,662 considered as paid. Mortgages and charges, £14,000.

Harrow Electric Light and Power Co., Ltd.—Capital, £50,000 in 6,667 ordinary and 3,333 preference shares of £5 each. Return dated March 14th, 1929. All shares taken up. £50,000 paid. Mortgages and charges, £25,000 debentures.

Telegraph Construction and Maintenance Co., Ltd.—Capital, £896,400 in £12 shares. Return dated April 4th, 1929. All shares taken up. £448,200 paid. £448,200 considered as paid. Mortgages and charges, nil.

Woodfyt Sales, Ltd.—Capital, £2,550 in 1,000 preference and 1,550 ordinary shares of £1 each. Return dated December 31st, 1928 (filed February 22nd, 1929). 638 preference and 205 ordinary shares issued and fully called up. Mortgages and charges, nil.

Looe Electricity Co., Ltd.—Satisfaction in full on May 29th, 1929, of debenture dated February 16th, 1927, securing all moneys due or to become due from the company to Barclay's Bank, Ltd.

Viozone, Ltd.—Satisfaction in full on June 1st of debenture dated April 24th, 1929, securing £148, 4s. 5d. Debenture dated July 9th, 1929, to secure £2,000, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: S. Strauss, 104, Dartmouth Road, N.W.2.

Castle Fuse and Engineering Co., Ltd.—Mortgage on 47 and 49, St. James' Place, and 26, Head Street, Liverpool, with fixtures, &c., dated July 4th, 1929, to secure all moneys due or to become due from the company to the Midland Bank, Ltd.

City Notes.

Kalgoorlie Electric Tramways, Ltd.

Addressing the annual meeting on July 15th, the chairman (Mr. C. C. Baker) said that in view of the stagnant condition of the Kalgoorlie mines an increase of £400 in the profit was satisfactory. There was a feeling of optimism in Kalgoorlie with regard to the mining industry. Improvements were being made in management, and with the co-operation of the Government and the trade unions it was hoped that a new era would be seen in mining in Western Australia. The company's returns for the first quarter of the current year had shown an improvement as compared with the first three months of 1928.

Kidderminster and District Electric Lighting and Traction Co., Ltd.

The net receipts for the year ended December 31st last fell from £9,994 to £9,769; with £506 brought forward the amount available is £10,275. After meeting expenses and loan interest and placing £2,080 to depreciation and reserve fund, the directors propose to pay an ordinary dividend of 5 per cent. and to carry forward £446. The tramway services ceased on April 2nd last and the abandonment of the line has been authorised. Steps are to be taken to liquidate the tramway company at an early date.

London Electricity Supply Companies' Shares.

One of the London electricity supply companies writes to point out that the yield on the company's ordinary shares is given incorrectly in our share list. It has been repeatedly pointed out in our "Stocks and Shares" letter that the yield is calculated upon the 7 per cent. dividend which takes effect in 1931. This, of course, does not apply to the County of London and Metropolitan Electric Supply Companies.

Oswestry Electric Lighting and Power Co., Ltd.

Mr. P. H. Minshall (chairman) presided at the annual meeting on July 16th. The report for the past year which he presented showed that 174 new consumers were connected during the year and that the total connections rose from 518 to 773 kW. A dividend of 10 per cent. was declared.

Companies Struck Off the Register.

The following companies have been struck off the Register, and are thereby dissolved:—

Bell's Radio and Electrical Co., Ltd.
Christian Bergh Electric Co., Ltd.
Continental Automatic Telephone and Electric Co., Ltd.
Torque Electrical and Engineering Co., Ltd.

Ross Electric Light and Power Co., Ltd.

The report for the year ended December 31st last shows that the gross profit fell from £1,544 to £1,522. After meeting debenture interest, depreciation, &c., there was a net profit of £48, which is placed against an adverse balance of £6,323 brought forward, reducing it to £6,275.

Western Union Telegraph Co.

The earnings report for the first half of the current year shows a total gross revenue of $72,610,036 (against $67,276,475), a gross balance of $9,313,566 (against $9,107,403) and a net income (after deducting bonded debt interest) of $7,508,533 ($7,305,158).

West Gloucestershire Power Co.

The directors have decided to issue forthwith 85,000 6½ per cent. £1 preference shares at par. These will be offered to existing preference shareholders in proportion to their holdings, and the British Empire Trust Co., Ltd., has agreed to take up any shares not subscribed.

Delhi Electric Supply and Traction Co., Ltd.

At an extraordinary meeting on July 17th resolutions were passed creating 30,000 new £1 shares (making £200,000) and capitalising £50,000 of the general reserve for distribution to shareholders.

County of London Electric Supply Co., Ltd.

An interim dividend of 3 per cent. has again been declared on the ordinary shares.

South London Electric Supply Corporation, Ltd.

The ordinary shares are again to receive an interim dividend of 3 per cent.

Richmond (Surrey) Electric Light and Power Co., Ltd.

An interim dividend of 4 per cent. (as last year) has been declared on the ordinary shares.

South Metropolitan Electric Light and Power Co., Ltd.

The interim dividend on the ordinary shares is 3 per cent., as last year.

Consolidated Gas, Electric Light and Power of Baltimore.

A dividend of $0.75 per share has been declared on the common shares for the quarter ending September 30th.

Brompton and Kensington Electricity Supply Co., Ltd.

The directors have declared an interim ordinary dividend of 10d. per share (as last year).

London Electric Supply Corporation, Ltd.

A dividend at the rate of 8 per cent. per annum has been declared for the past half-year.

Chelsea Electricity Supply Co., Ltd.

An interim dividend of 10d. per share has been declared on the ordinary shares, as last year.

Mather & Platt, Ltd.

The directors have again declared an interim dividend of 5 per cent., free of tax.

Bournemouth and Poole Electricity Supply Co., Ltd.

The interim ordinary dividend is maintained at 6 per cent.

German Companies.

The *Wilhelminennof Cable Co.*, Berlin, which is associated with the Felten and Guilleaume Co., earned net profits, including balance forward, amounting to 249,000 marks in 1928, as compared with 253,000 marks in the previous year. The dividend remains at 10 per cent.

The *Robert Bosch Co.*, Stuttgart, states that there was a large increase in the turnover in 1928, but the profits only advanced to a moderate extent owing to the depression in prices. Including the balance forward the accounts show net profits of 2,357,000 marks, against 1,572,000 marks in 1927. After setting aside 1,000,000 marks for the formation of a pension fund, it is proposed to carry the balance forward.

French Companies.

The *Société des Accumulateurs du Nord* has declared a dividend of 12 fr. per share out of net profits of 345,000 fr. for 1928.

The *Compagnie Générale d'Entreprises Electriques* reports net profits and balance forward amounting to 2,250,000 fr. The dividend is 60 fr. per original share, and 633,000 fr. has been carried forward.

Stocks and Shares.

MONDAY EVENING.

STOCK Exchange markets are in anything but a happy condition. There are half a dozen quite valid reasons which tend to prevent money from coming into the markets, and which, although by no means novel, appear to become accentuated by the increase of uncertainties that arise. The dearness of money, which is the paramount cause of the depression, has been a contributing factor to dulness for some time past, and there is talk of a possible rise in the Bank Rate on Thursday in this week. The close approach of the holiday season, and the recent extreme heat, combine to lay the ordinary seasonal check upon activity. The uncertainties surrounding domestic legislation press upon shares in companies connected with some of the principal industries. Abroad, the crisis between Russia and China created another factor in restraint of business on this side. New issues are receiving a welcome less warm than the weather has been. The new Scottish Power ordinary were, however, quickly snapped up.

Two Hundred Points Rise.

From the purely spectacular point of view, British Electric Traction deferred ordinary stock easily heads the list of price movements. The stock has risen 200 points, being now quoted at 1,575, the other stocks of the company showing no alterations. The gift recently made to Mr. Emil Garcke has rapidly increased in value. Stock changes hands with a surprising degree of frequency, having regard to the price that British Electric Traction deferred has attained. London and Suburban Traction preference shares shed 1s., going back to 10s., in consequence of the rejection of the London Traffic Bills. Other companies connected with London transport showed no variations on the week.

Home Railway Heaviness.

Home railway companies will be declaring their dividends within the course of the next few days, though this consideration has failed to exercise any particular influence over prices. The Underground Group announced its dividends a fortnight ago. The tendency of prices is heavy, Districts and Metropolitans both being 1 down. The dividend this time last year on Metropolitans was at the rate of 2½ per cent.; market anticipation looks for this to be maintained, though the course of prices suggests that there is at least a little doubt felt on the point.

Interim Dividends.

The County of London Electric Supply group has declared its interim dividends, all of them being at the same rates as those of a year ago. The County Company's own dividend, the South London Electric and South Metropolitan are 3 per cent. in each case. Richmond (Surrey) pays 4 per cent.; the price is easier at 45s. Bournemouth and Poole declares an interim of 6 per cent; the shares are 2s. 6d. lower at 62s. County of London have lost 2s. at 53s. 6d. Urban Electric ordinary shed 1s. 9d., receding to 38s. 3d. Shropshires keep closely to 22s. 6d. Metropolitans and Midland Counties are each lower at 45s. 9d. and 33s. respectively. Smithfield Markets Electric ordinary remain at 25s. Electric Supply Corporation gave way to 53s. 3d., a fall of 1s. 9d. North Metropolitans fell to 52s. 6d. Yorkshire Electrics and Lancashires have resisted the general tendency, being 6d. harder at 37s. and 29s. 6d. There has been a mild inquiry for Whitehall 7½ per cent. preference; the price hardened to 24s. 6d. Chelsea Electric drooped to 26s. The interim dividend of 10d. per share is the same as that of a year ago. The Brompton and Kensington interim also is 10d. per share.

Cables and Wireless.

Cables and Wireless stocks show substantial falls. The 5½ per cent. preference holds its ground at 94½, but the "A" ordinary has come down from 88 to 85, and the "B" ordinary from 92 to ten points lower. The reason for the weakness in the last two stocks may be ascribed to liquidation of weak bull accounts previously built up on the impression that the United States would be a heavy buyer of, more particularly, the "B" stock, whereas nothing of this sort has developed so far. It is possible that the Americans have been accumulating a small quantity. So far as the preference is concerned, it may be suggested that the security is sufficiently sound to warrant the stock being regarded as a first-rate investment. It carries a dividend of 1⅛ per cent., due at the end of this month, and at the present price of 94½, the return on the money comes to £5 18s. 6d. per cent. Globe Telegraph and Trust have dropped back to 26½, a fall of 20s. Canadian Marconis are dull at 2 1/16. A rise of 10s. lifted Great Northern Telegraphs to 31. International Telephone and Telegraph put on 4½, to 114½, and American "T. & T." at 254 has reacted a trifle.

Indian, Colonial and Foreign.

Perak River Hydro-Electric ordinary are being dealt in on the basis of 15s., and the 7 per cent. participating debenture around 112. River Plate Electricity ordinary stock stands at 220 middle, and Melbourne Electric ordinary at 177½. London Power 5 per cent. debenture keeps very firm at 101; the stock carries nearly five months' interest in its present price. West Gloucestershire Power 6½ per cent. participating preference stock was last marked at 70, and the 5½ per cent. first mortgage sinking fund debenture recently sold at 93½. Barcelona Traction Light and Power ordinary shares of $50 each are 57½. Atlas Light and Power ordinary remain at about 27s. 6d., and the 7 per cent. preference are 23s. 6d. Delhi Electric Supply and Traction ordinary shares of £1 each are quoted at 58s. 9d.; Calcutta Electric ordinary at 54s. 6d.; Madras ordinary at 31s. 3d.; and Cawnpore ordinary at 32s. 6d. Victoria Falls Power ordinary shares are a fairly active market around 63s. 9d., the preference being 34s. 9d. and the first and second debentures (upon both of which the interest is paid free of tax) 109 and 103 respectively.

"Dollar" Shares.

On the attention paid to utility shares in American companies, Hydro-Electrics rose superior to the prevailing Stock Exchange tendencies, the price spurting to 53¼. Reasons were given here, earlier in the month, for the confidence with which the company's supporters regarded the outlook, the price at that time being about 44. Shares of the International Holdings Corporation, with which the Hydro-Electric has close association, advanced sympathetically to 10¼. Mexican Light and Power common shares are no less than 15 points higher at 92½, the New York buying, mentioned here last week, being very persistent. The only other movement amongst Mexicans is a decline of ½, to 75, in the Tramways Company's 5 per cent. bonds. Pachuca fives changed hands a fortnight ago at 71½. Shawinigan Water common shares are 90½, Montreal Light, Heat and Power 119, Power Corporation of Canada 116½, Consolidated Gas and Electric of Baltimore 145, and Pennsylvania 106½, six points up. These last-named five are all shares of no par value. Canadian General Electrics, quoted at 255, are 50-dollar shares. Brazilian Tractions have gone back to 61.

Miscellaneous Movements.

General Electrics have rallied to 2⅛, Associated Electrical ordinary moved downwards to 45s., Brush ordinary went back to 134, and Electric Constructions to 15s. The tendency of the manufacturing group is dull. Iron and steel issues show no strength. People are afraid to buy shares in companies liable to have profits affected by legislative action either before or after the next Budget. The rubber share market has retired into obscurity in consequence of a decline in the price of the raw product.

Share List of Electrical Companies.

HOME ELECTRICITY COMPANIES.

	Nom.	Approx. Dividend. 1927.	1928.	Price July 23 1929.	Rise or fall	Yield p.c.
	£					
Bournemouth and Poole	1	15	15	62/-	−½	4 16 9
Brompton Ordinary	1	8½	8½	26/-	—	5 7 8
Charing Cross Ordinary	1	8½	8½	26/6	—	5 5 8
do. do. 4½% Pref. ...	1	4½	4½	17/6	—	5 2 10
Chelsea	1	8¾	8½	26/-	−6d.	5 7 8
City of London	1		10	38/9	—	4 4 6
do. do. 6% Pref.... ...	1		6	23/-	—	5 4 4
Clyde Valley	1		8	36/3	—	... ...
County of London	1	7½	10	54/-	−2/-	3 14 1
do. do. 6% Pref.... ...	1	6	6	23/-	—	5 4 4
Edmundson's 7% Pref.	1	7	7	34/-	−1/-	5 16 8
Elec. Supply Corporation	1	11	11	53/3	−1/9	4 2 8
Kensington Ordinary	1	8	8	26/-	—	5 7 8
Lancs. Light and Power	1	7½	7½	29/6	+6d.	5 1 8
London Electric	1	8½	9	28/6	—	4 18 3
Metropolitan	1	9	9	45/9	−6d.	3 13 6
do. 4½% Pref. ...	1	4½	4½	17/6	—	5 2 10
Midland Counties	1	6½	6½	33/-	−1/-	3 18 9
Mid. Elec. Power	1	15	8	37/6	—	4 5 4
Newcastle-on-Tyne Ordinary ...	1	6	6	27/-	—	4 9 0
do. 7% Pref.	1	7	7	26/-	—	5 7 8
Notting Hill 6% Pref.	10	6	6	11	—	5 9 1
North Met. Elec. 6% Pref.	1	6	6	23/-	—	5 4 4
St. James' and Pall Mall	1	8	8	27/6	—	5 1 10
Scottish Power	1	8	8	30/-	—	5 6 8
South London	1	8½	8½	26/6	—	5 5 8
Urban Ordinary	1	7	—	38/3	−1/9	... ...
Westminster Ordinary	1	8½	8½	26/-	—	5 7 8
Whitehall Elec. Invst. 7½% Pref. ...	1	7½	7½	24/6	+3d.	6 2 5
Yorkshire Elec.	1	8	8	37/-	+6d.	4 6 6

HOME RAILS.

Central London Ord. Assented ...	Stock	4	4	73	—	5 11 1
Metropolitan	„	8	8½	68	−1	6 0 8
do. District	„	4	5	74½	−1	6 14 3
Underground Electric	£1	5	7	29/6	—	6 4 6
do. do. Income ...	Bonds	6	6	107	—	5 12 1

TELEGRAPHS AND TELEPHONES.

Anglo-Am. Tel. Pref.	Stock	6	6	102	—	5 17 8
do. Def.	„	1½	1½	24½	—	6 2 6
Automatic Telephone	1	10	12½	2	—	6 5 0
Cables & Wireless Pref.	Stock	—	—	94½	—	... ..
do. A Ord.	„	—	—	85	−8	... ...
do. B Ord.	„	—	—	82	−10	... ...
Globe Tel. and T. Ord.	10	10	10	26½	−1	*3 15 6
do. do. Pref.	10	6	6	11½	—	5 6 6
Great Northern Tel.	10	20	17½	31	+½	5 13 0
Indo-European	25	10	10	50½	—	*4 19 0
Marconi	10/-	10	20	76/-	—	... ...
Marconi-Marine	1	12½	15	3	—	5 0 0
Oriental Telephone Ord.	1	12	12	3-⅛	—	... ...

HOME AND FOREIGN TRAMS, &c.

Anglo-Arg. Trams First Pref. ...	5	5½	5½	3-⅛	—	8 0 0
do. do. 2nd Pref. ...	5	6	6	8½	—	8 11 6
do. do. 5% Deb. ...	Stock	5	5	74½	—	6 14 3
British Electric Traction Def. Ord.	„	5	5	1575	+200	... ...
do. do. Pref. Ord.	„	8	8	128	—	6 5 0
Brazil Traction	100	7	8	61	—	3 5 7
Brit. Columbia Elec. Rly. Pcc. ...	Stock	5	5	99½	—	5 5 10
London & Sub. Trac. 5% Pref. ...	1	Nil	Nil	10/-	−1/-	... ...
London United Tram Deb. ...	Stock	4	4	59	—	6 15 7
Mexico Trams, 5% Bonds	—	5	5	75	−½	6 12 9
Mexican Light Common	100	Nil	Nil	92½	+15	... ...
do. 7% Pref.	100	7	7	76½	—	9 8 0
do. 1st Bonds	—	5	5	80	—	6 5 0
Yorkshire (West Riding)	1	Nil	Nil	5/-	—	... ...

MANUFACTURING COMPANIES.

Assoc. Elec. Ord.	1	6	—	45/-	−9d.	2 13 4
Babcock & Wilcox	1	18	15	62/6	—	*4 16 0
British Aluminium Ord.	1	10	10	48/-	—	*4 3 4
British Elec. Transformer Pref. ...	1	7	7	13/9	—	9 6 6
British Insulated Ord.	1	15	15	84	—	3 17 4
Brush Ord.	Stock	10	10	134	−1	7 9 3
Callenders	1	15	15	83	—	4 0 0
do. 6½% Pref.	1	6½	6½	12	—	5 4 0
Crompton Parkinson Ord.	5/-	—	—	21	—	... ...
do. 8% Pref.	1	8	—	25/-	—	6 8 0
Edison-Swan 1st Pref.	1	7½	7½	25/9	—	7 1 9
do. 5% Deb.	Stock	5	5	84½	—	5 18 4
Electric Construction	1	7½	5½	15/-	−⅛	7 6 8
Enfield Cable Ord.	1	20	20	4½	—	4 9 0
English Electric	1	Nil	Nil	6/3	—	... ...
do. do. Pref.	1	8	Nil	7/6	—	... ...
Gen. Elec. Pref.	1	6½	6½	24/-	+1/-	5 8 4
do. Ord.	1	10	10	2½	+⅛	3 16 4
Henley	1	25	30	6½	—	4 12 4
do. 4½% Pref.	5	4½	4½	4½	—	5 6 0
India-Rubber		Nil	Nil	15/-	—	... ...
Johnson & Phillips		10	—	96/3	—	5 10 4
Siemens Ord.	1	7½	7½	27/6	—	5 9 1
Telegraph Construction	12	10	10	29½	—	*4 19 3

* Dividends paid free of Income Tax.

Swedish Electrical Exports.

Statistics for 1927 and 1928.

THE following tables, based on the recently-issued Swedish trade returns, compare last year's electrical exports with those for the preceding year, showing the increases or decreases. Details of the principal destinations are also given. The increasing trade with Soviet Russia is an outstanding feature of the statistics.

	1927. 1,000 Kronor.	1928. 1,000 Kronor.	Inc. or dec. 1,000 Kronor.
Cells and batteries—			
Total	2,170	2,754	+ 584
To Great Britain	37	30	− 7
,, Norway	185	305	+ 120
,, Austria	—	158	+ 158
,, Soviet Russia	1,165	1,306	+ 141
,, Japan	48	106	+ 58
Wireless apparatus—			
Total	2,338	2,074	− 264
To Norway	77	77	—
,, Denmark	174	270	+ 96
,, Finland	448	501	+ 53
,, Germany	98	121	+ 23
,, France	101	25	− 76
,, Spain	65	16	− 49
Electrical generators and motors weighing each: Not more than 50 kg.—			
Total	845	6,831	+ 5,986
To Denmark	20	147	+ 127
,, Netherlands	27	232	+ 205
,, Great Britain	134	157	+ 23
,, United States	14	64	+ 50
,, Australia	28	130	+ 102
50 to 3,000 kg.—			
Total	7,333	9,378	+ 2,045
To Soviet Russia	809	1,898	+ 1,089
,, Norway	37	50	+ 13
,, Finland	924	992	+ 68
,, Great Britain	460	590	+ 130
,, Spain	372	400	+ 28
,, Argentina	231	311	+ 80
,, New Zealand	27	28	+ 1
,, Australia	117	137	+ 20
,, Belgium	156	255	+ 99
More than 3,000 kg.—			
Total	4,648	3,504	− 1,144
To Finland	1,539	937	− 602
,, Belgium	209	327	+ 118
,, Canada	282	853	+ 571
,, Italy	389	107	− 282
,, Soviet Russia	455	824	+ 369
Vacuum cleaners—			
Total	16,698	16,912	+ 214
Electricity meters—			
Total	3,944	9,600	+ 5,656
To Finland	1,487	2,958	+ 1,471
,, Soviet Russia	—	2,108	+ 2,108
Other electrical measuring instruments—			
Total	58,590	71,274	+12,684
To Japan	6,889	22,690	+15,801
,, Poland	—	8,000	+ 8,000
,, United States	4,750	6,575	+ 1,825
Transformers weighing more than 3,000 kg.—			
Total	3,025	2,283	− 742
To Soviet Russia	842	986	+ 144
,, Belgium	62	308	+ 246
,, Italy	176	75	− 101
,, Great Britain	361	286	− 75
Electric lamps (metal filament)—			
Total	210	214	+ 4
To Finland	99	68	− 31
,, Denmark	50	53	+ 3
Carbon for electrical purposes—			
Total	310	386	+ 76
To Norway	62	122	+ 60
,, Finland	26	60	+ 34
,, Italy	15	4	− 11
Starting, regulating and reduction resistances—			
Total	1,021	1,204	+ 183
To Russia	259	337	+ 78
,, Spain	80	60	− 20
,, Australia	15	13	− 2
,, Finland	226	214	− 12
Stators, rotors, current collectors, magnet coils, &c.—			
Total	596	1,095	+ 499
To Norway	27	20	− 7
,, Finland	57	25	− 32
,, Great Britain	104	178	+ 74
,, Soviet Russia	65	52	− 13
Oil-break switches (hand)—			
Total	571	730	+ 159
To Soviet Russia	183	454	+ 271
,, Spain	5	17	+ 12
,, Great Britain	1	13	+ 12
,, Finland	76	48	− 28
Other oil-break switches, also box switches, &c.—			
Total	1,349	1,651	+ 302
Knife switches, mounted—			
Total	5,893	6,980	+ 1,087
Other switches—			
Total	518	452	− 66
To Finland	88	74	− 14
,, Soviet Russia	113	122	+ 9
,, New Zealand	127	16	− 111
Safety appliances, mounted or not—			
Total	468	562	+ 94
To Finland	39	61	+ 22
,, Poland	75	47	− 28
,, Netherlands	61	23	− 38
,, British South Africa	13	36	+ 23
Telephone apparatus—			
Total	3,288	3,264	− 24
To Finland	276	341	+ 65
,, Poland	557	487	− 70
,, Netherlands	228	414	+ 186
,, Spain	50	59	+ 9
,, Mexico	110	215	+ 105
,, Argentina	285	456	+ 171
,, Egypt	156	12	− 144
,, British South Africa	172	184	+ 12
,, China	118	81	− 37
Telegraph apparatus—			
Total	6,703	10,521	+ 3,818
To Finland	586	379	− 207
,, Poland	991	1,243	+ 252
,, Netherlands	1,266	2,010	+ 744
,, Spain	57	48	− 9
,, Egypt	157	89	− 68
,, British South Africa	290	197	− 93
,, Mexico	422	905	+ 483
,, Australia	23	23	—
Cable and wire (metal sheathed)—			
Total	2,191	2,766	+ 575
To Poland	486	408	− 78
,, Finland	86	119	+ 33
,, Mexico	211	912	+ 701
,, Argentina	312	567	+ 255
Cable and wire insulated with textile materials, paper, varnish, &c.:— Diameter of wire not more than 0.5 mm.—			
Total	413	476	+ 63
To Soviet Russia	131	—	− 131
,, Great Britain	26	54	+ 28
,, Denmark	25	47	+ 22
,, Poland	20	54	+ 34
,, British South Africa	26	62	+ 36
Do., greater than 0.5 mm.—			
Total	192	350	+ 158
To Mexico	7	9	+ 2
,, Netherlands	8	28	+ 20
,, Finland	34	39	+ 5
,, Soviet Russia	108	201	+ 93

Indian Electrical Notes.

(From Our Indian Correspondent.)

Hydro-Electric Power in Madras.

THE Madras Government, alive to the immense possibilities of developing the water power resources of the Presidency, is carrying out a series of investigations and constructions. Major H. G. Howard, chief engineer of the Hydro-electric Development Department, is busy completing the Glen-Morgan scheme, which is an auxiliary of the Pykara project and is expected to be in operation shortly. The Pykara scheme is now before the Government of India awaiting the sanction of the Secretary of State.

Major Howard has recently inspected the Periyar Lake in the Madura district to ascertain whether power can be developed from the lake, and is submitting a report to the Government advocating its feasibility. An advance party has been sent to investigate the Kolab project, which, if developed, will supply power to Vizagapatam, now a growing harbour and railway centre, and Vijianagram and neighbouring towns. The Jeypore State will also benefit from the scheme, as all the water lies in the heart of the State. The Papanasam hydro-electric scheme, which is intended to supply electricity from the Papanasam waterfalls for working paper mills in the forests of that district, has been deferred owing to the difficulty of finding funds, as the Government is at this stage committed to the Pykara and its auxiliary schemes.

South Indian Railway Electrification.

In connection with the proposals for the electrification of the South Indian Railway, the Railway Board, being of opinion that the electrification of the line need not be delayed until sanction to the Pykara scheme is given, and that power can be obtained from the Glen-Morgan project now in progress, has sanctioned the immediate electrification of the adhesion section of the Nilgiri Mountain railway between Conoor and Ootacamund— a distance of 13 miles.

The Kalyan Power House.

Interest has been aroused by a reference to the Kalyan power house, made recently by Mr. Tairsee, president of the Indian Merchants' Chamber, who contended that the station was unnecessary as the Tata Hydro-electric Power Co. had available a sufficient source of supply. Mr. Rau, Financial Commissioner for Railways, in reply, stated that among other reasons for the construction of the Kalyan power house, was the necessity to the railways of a supply of electrical energy which the Tata Company could not give. The power station is being constructed for an initial capacity of 40,000 kW, but this will eventually be doubled. A main switching station operating at 110,000 V is about to be put into commission. The power house is being equipped with four 10,000-kW generating sets and six-stoker-fired boilers. Generation will be at 6,600 V, 3-phase, 50 cycles, stepping up to 110,000 V for transmission to eleven sub-stations. The high-voltage switchgear will comprise equipment controlling four banks of step-up transformers and four overhead lines, together with coupling and sectionalising equipment, for the duplicate busbars. The feeder oil switches will have isolating switches on each side and a triple-pole isolating switch for isolating the breaker without interrupting the service.

Electric Drive for Cotton Mills.

A plant characteristic of the modernisation of textile mills in India is the new electric drive introduced in the Ahmedabad Advanced Mills. A new power and boiler house with adequate equipment, including a cooling tank and necessary services, has been constructed and a number of electric motors suitable for the group drives of the mill machinery have been installed. The equipment includes a 1,700-kW turbo-generator running at 3,000 r.p.m.

Electricity in Agriculture.

The Mysore State leads the way in the development of hydro-electric power and great strides have already been made in this direction. There has been considerable activity recently with regard to rural electrification, and an indication of the power potentialities of the State is the fact that during the past year 16,894,910 kWh was generated. A note on the application of electricity to irrigation and agriculture has recently been prepared by Sir Alfred Chatterton at the instance of the Mysore Government, in which he enumerates several practical problems suited for experimental work in connection with the distribution of power for rural industries, including the raising of water for irrigation purposes, and emphasises the possibility that the industrial future of Mysore may to a great extent depend on the development of industries of the electro-chemical and electro-metallurgical type. Referring to the distribution of power in rural areas it is pointed out that it is at present employed to drive small motors and pumps of which so far about 70 have been installed, and there is scope for progress in this direction if the question of well irrigation by efficient plant for lifting the water is studied. Each installation should be designed to secure maximum efficiency, and efficiencies ranging from 50 to 70 per cent. should be obtained.

New Company.

A new company known as the Behrampur Electric Supply Co. has been formed at Behrampur, Bengal, with a capital of Rs. 3 lakhs to undertake the supply of electricity in that town which is an important railway and industrial centre.

New Stations.

The new power station of the Quetta Electric Supply Co., Ltd., was opened on June 10th by the Honourable Col. E. H. James, Agent to the Governor-General and Chief Commissioner of Baluchistan.

The Governor of Bombay recently inaugurated the Lonavla electrical installation, whereby Lonavla and Khandala will be served with electricity which is being taken in bulk from the Tata Hydro-Electric Power Co.

Tube Railway for Calcutta.

A representative from Messrs. Merz & McLellan, consulting engineers, has considered proposals for the construction of a tube railway in Calcutta. The cost of the scheme is estimated at £4,000,000, and it would be carried out in conjunction with the scheme for the electrification of the suburban lines of the East Indian and Eastern Bengal Railway.

The Spanish Electrical Market.

Opportunities for British Plant.

BRITISH visitors to Spain in connection with the recent World Power Conference will have had an opportunity of seeing something of the electrical developments which are proceeding in that country, and they must have realised that a great scope exists for manufacturers of electrical plant of all kinds.

The market is certainly worthy of attention in view of the many projects which are in hand or in contemplation. The principal schemes which are occupying the minds of the country's industrial leaders are those for developing hydro-electric power in the valleys of the Douro and Tagus. Also of importance are the plans for the extension of tramways and light railways. At the same time electric lighting is being introduced into an increasing number of the smaller towns, particularly those within the radius of hydro-electric power stations, yet the water power resources of the country are at present but poorly utilised. In the past Germany has done the principal trade in electrical materials in the Spanish market.

One of the large metallurgical groups is electrifying its workshops, and it is expected that other manufacturing concerns will follow its example. Many of the textile mills in Barcelona and district, where electricity is supplied at a moderate price, have abandoned steam power. As the spinning and weaving plant is of British make it should not prove difficult to extend the use of British motors for individual drive. Electrical mining machinery from Germany is fairly well established, particularly amongst the Spanish-managed companies, but there should be opportunities for the sale of British plant to the concerns where British interests predominate.

In the shipyards and machine shops in the neighbourhood of Bilbao, Barcelona, and many other centres, good prospects lie before small electrical tools such as portable drills. Little headway has been made in adapting electricity to agricultural purposes except perhaps among the olive growers of Andalusia. There also electrically-driven centrifugal pumps are used for irrigation. Other fairly promising districts are the Ebro River valley, where sugar-beet mills and canning factories are found, and the north of Old Castile and certain parts of Vizcaya and Asturias.

Alternating current is more common than direct current, and the usual system is three-phase at 50 cycles, 220 V. Little demand exists for labour-saving domestic appliances, household labour being cheap. There is an increasing sale in the cities for ceiling fans and desk fans, quantities of which are still imported, although a certain number are manufactured in Spain. Hotels and restaurants have set an example in the use of electric refrigerators which is being followed to some extent in the more wealthy homes, where electric heaters also are extensively used. There is little prospect for electric wire and cable owing to the high tariff protection of the locally-made product. Ordinary insulators, both glass and porcelain, are made in Spain, but special types are imported. There is an increasing production, particularly in Madrid and Barcelona, of incandescent lamps and wiring devices, motors, generators, transformers, heaters and batteries. Little heavy electrical machinery is made, however.

The International Lighthouse Conference.

A report of the proceedings, including the developments and improvements introduced during the past few years in electrical methods of illumination and signalling.

(*Continued from page 129.*)

ON July 11th two sessions were devoted to the discussion of wireless fog signals, wireless telephone intercommunication, and the distant control by wireless of automatic unattended apparatus. In the morning the discussion was devoted to wireless fog signals, including synchronous signalling and characteristics and times of signalling.

The CHAIRMAN (Admiral Mansell) said that perhaps the greatest advance in aids to navigation had been the introduction of wireless fog signals. Initiated in America with spark transmission, those wireless beams provided means of enabling the mariner to obtain bearings when lights were invisible and sound signals inaudible. Programmes of wireless fog signals either had been worked out, or were being developed, in many countries and experiments were being carried out in many parts with a view to commencing such services. Spark transmission had now been abandoned because of the interference it caused with commercial and other radio stations, the modern system of wireless fog signalling being by means of valves for generating continuous or modulated continuous waves. The wave-length adopted was within a band of from 950 to 1,050 metres, which had been internationally allocated for the service.

Mr. J. P. BOWEN, speaking with regard to the work of Trinity House regarding wireless fog signals, said that four stations had been established and four more were in course of erection. The plant was entirely automatic and the times of transmission were controlled by clock to avoid interference with neighbouring signals. Some lighthouse authorities, he said, were deferring the installation of wireless fog signals because of their inability to decide upon the most suitable system, and for that reason he gave a brief description of the three systems which Trinity House had studied and indicated the factors which had guided Trinity House in adopting the system it had. The first system investigated was the revolving sound-wave Marconi wireless beam, which employed a short-wave aerial behind which was placed a vertical wire screen deflector, the whole being mounted and rotating on a steel frame carriage. The deflector gave highly directional properties to the waves, and as the beam revolved different Morse-code signals were sent out at each quarter point of the compass. For the reception of the signals short-wave receivers were installed on board the vessels receiving them, and the mean of the signals gave the direction of the sending station. There were certain disadvantages in this system, however, and its use was abandoned. The second system studied was the Royal Air Force rotating beam system, which used a loop transmitter rotated at a constant speed, the properties of which were to give good signals of maximum strength in the plane of the frame and of the minimum value at right angles to the frame. The system was simple in operation, but, like the Marconi beam, was inapplicable to a floating body because of the relativity of the bearing to true north. Moreover, the operating power required was comparatively large and the system was susceptible to local interference, necessitating the selection of special sites. The system was not yet fully out of the experimental stage, so that its field of utility for marine navigation could not at the moment be fully gauged. The third system was the all-round beacon transmitter universally adopted by those countries which had developed, or were developing, programmes of wireless fog signals, and it was that type which had for the present been selected by Trinity House. It required the provision of a somewhat expensive direction-finding instrument on board ship, but some of the advantages of the system were (1) comparatively small initial cost, (2) low power and consequently small maintenance cost, (3) availability for shore or lightship stations, (4) range of utility. The Trinity House installations comprised a simple valve oscillation generator, automatic in operation from start to finish, and under the control of a master clock which governed the time and period of transmission. Trinity House, concluded Mr. Bowen, had adopted a wave range of from 950 to 1,050 metres and a note frequency range of from 800 to 1,200 cycles.

Herr G. MEYER (technical officer for seamarks, Germany) said that Germany had during the past few years recognised the necessity for the adoption of directional wireless fog signals, had equipped a number of stations in the North Sea, and was now about to do the same in the Baltic Sea. He regarded lightships as the most favourable places for setting up fog signal stations owing to the greater freedom from deflection of the waves, as compared with coast stations. Where lightships were not available, then special care must be taken in selecting coast stations. German wireless fog signals worked on a wave-length of 962.5 metres, the marine wireless directional wave-lengths being 987.5 metres, 1,012.5 metres, and 1,037.5 metres. The German radio fog signalling system had been worked out by the Telefunken Company and the stations worked with a capacity of from 130 to 160 watts, the note frequency being 500, 700, and 900 vibrations per second. As a result of the work done in Germany on this subject certain conclusions had been arrived at which included not only the adoption of a national wave-length, but also the adaptation of any national scheme to international requirements, including agreements as to the wave-length to be employed, transmitting power, the output, and the sound frequency.

Dr. G. R. PUTNAM (United States) said there were 60 wireless fog signalling stations in operation in the United States, but he did not think the best system had yet been developed. The apparatus in use he regarded as still tentative, as also were the wave-lengths and sound frequencies, whilst the tendency in the United States was to use less power in the transmitting stations. Lightships were considered the most suitable positions for installing wireless fog-signalling apparatus. He expressed the opinion that ultimately a continuous wave would be used in preference to a modulated continuous wave, although it would take some time to make the change, due to the difficulty of modifying the wireless compasses now in use with the modulated wave. There was a great distinction between the work being done in America and in Europe concerning the characteristics of radio fog signals. The idea in America was that the characteristic should be as simple and as readily distinguishable as were the characteristics of lights and audible fog signals, so that navigators without expert radio knowledge could detect them. The signals should not be designed for use by skilled radio operators only, and in America they did not see why there should be any greater complication than the continuous repetition of one signal, or one Morse-code letter, so that anybody could recognise the station. For instance, Nantucket sent out four dashes and nothing else. It had been estimated that the wireless fog-signalling system could be installed around all United States coasts at a total cost of £100,000, which was less than the cost of a single lighthouse and not much more than the cost of one light vessel.

Mr. ALAN STEVENSON (Great Britain) emphasised the necessity for the essential principle of simplicity. In the British Isles 500-watt beacons were being installed; they were of the greatest benefit to navigators, but alone they were not sufficient, and he suggested that a system of synchronisation of radio and sound signals must be the ultimate aim. He was pleased that the United States was working along those lines and apparatus designed by his firm would shortly be ready for demonstration. It worked on a wave-length of 1,000 metres and with a power of 30 watts, the sound fog signal being broadcast automatically by microphone, so that the navigator could get accurate bearings with a simple crystal receiver. The apparatus had been experimented with at the Cumbrae lighthouse on the Clyde, the emitted sound of the diaphone being broadcast by wireless telephone, so that a navigator could calculate his distance from the signal by determining the interval of time between the reception of the wireless and sound signals. It constituted a system of synchronous signalling, using an air sound signal instead of the usual submarine signal, in conjunction with the wireless signal.

Among a number of other communications to the discussions it was pointed out that a wireless fog signal was to be installed on the Maas light vessel of the Netherlands lighthouse service. Seven wireless fog signals had been installed in Denmark, four at lighthouses and three on light vessels, two of the latter being also equipped with submarine oscillators and synchronous signalling apparatus.

Mr. BOWEN said that, although the system mentioned by Mr. Stevenson was very good, it was not altogether novel.

(*To be concluded*).

Radio Picture Transmission.

Though Berlin (Witzleben) has been transmitting pictures for some time now during the evening programme hours, it has been difficult to receive them in many parts of this country owing to the "wipe-out" effect of 5GB. Under the Prague plan, Witzleben has a wave-length of 418 metres, whilst 5GB works on 479. The German station is now easy to receive, and good pictures may be obtained from it by the Fultograph user. It should be noticed that Witzleben is relayed by a station working on 283 metres; despite the fact that this is a common wave-length, the transmission is often to be received quite clear of interference. Another good station at the present time for picture reception is Posen, with a wave-length of 335 metres, which station is transmitting pictures every evening at 10.15 p.m. or 10.30 p.m.

Modern Switchgear and Transformers.

Items of special interest observed during a visit to the Stafford works of the English Electric Co., Ltd.

BY courtesy of the English Electric Co., Ltd., on Thursday last week representatives of the electrical Press visited the switchgear and transformer workshops of the company at its Stafford works. At the present time the shops are particularly busy, and among the many various equipments passing through the processes of manufacture were seen some items of outstanding interest. The switchgear department has been considerably extended during recent years, and the latest addition of a second large erecting bay of 18,000 sq. ft. brings the total area devoted to switchgear to over 100,000 sq. ft.

Fig. 1 shows one of the main switchgear-erecting bays; truck-type switchgear may be seen in the foreground, and kiosks and large outdoor oil circuit breakers are depicted at the far end of the shop.

Fig. 1.—Main Switchgear Erecting Bays.

The company has introduced some special features in its design of compound-filled switchgear, with a view to simplifying the maintenance and overcoming difficulties hitherto met with in this class of equipment. It is not uncommon in connection with compound-filled switchgear to see slight compound leakage at the joints. In the "English Electric" design the compound-filled chambers are filled at the works, and are dispatched with cover plates bolted over their openings. On erection on site these plates are removed and small expansion chambers are fitted which allow the compound to expand without being forced out between the joints. Further, the compound can return to its place when the temperature falls, so that by this means it is ensured that air spaces and cavities cannot be formed inside the compound-filled chambers. Another important feature of the design is the provision of dust and moisture-tight shutters. When the pillar is withdrawn the shutters, which are provided with a flexible steel lining edged with felt, are pressed on to the spout faces by means of an ingenious cam arrangement on the shutter mechanism. This prevents the accumulation of dust and moisture on the inside lower part of the spout face, which, incidentally, is the one part which cannot be cleaned without making the whole of the switchboard dead. The shutter mechanism is shown fairly clearly in fig. 2, which represents part of a 16-pillar metalclad, compound-filled, switchgear installation with duplicate busbars and selector switches ready for dispatch.

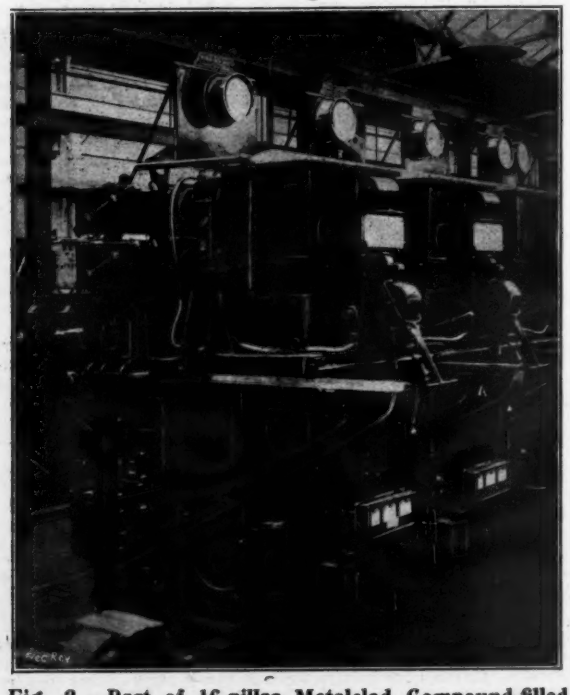


Fig. 2.—Part of 16-pillar Metalclad Compound-filled Switchboard Installation.

In fig. 3 is depicted a 132-kV oil circuit-breaker manufactured by the company for the national "grid" scheme of the Central Electricity Board.

A very striking control board which was seen at the works practically completed and assembled before dispatch is that indicated in fig. 4. It is to be supplied to a large power station in London to replace old-type existing equipment and will control some 47 half-million kVA metalclad pillars for e.h.p. feeders, alternators, and so on. The large holes in some of the centre panels are for the assembly on site of existing voltage-regulator equipment. Some idea of the magnitude of the task of assembling the equipment may

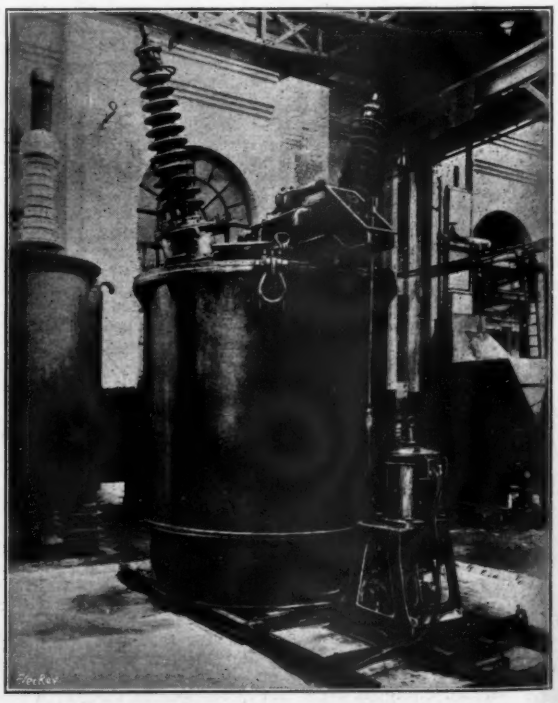


Fig. 3.—132-kV "Grid" Oil Circuit Breaker.

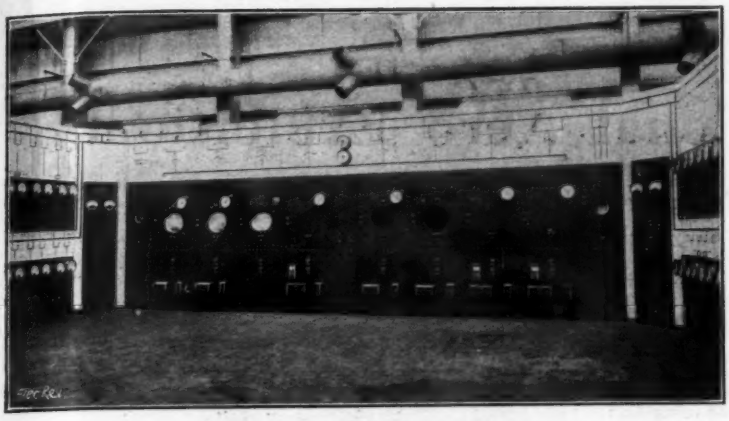


Fig. 4.—Electrical Remote Control Board.

be gathered when it is realised that each panel will have to be connected up separately without disturbing the running of the station.

In the company's transformer shops at the present time equipments totalling several hundred thousand kVA are in various stages of manufacture. They include a number of 132-kV transformers for the first section of the national electricity scheme; these are three-phase units with on-load tap-changing equipment on the 132-kV side. The "English Electric" scheme of on-load tap-changing provides tappings on the main winding corresponding to half the number of voltages required, and intermediate voltages are procured from the mid-point of an auto-transformer. Connections are made in various combinations by means of external contactor mechanism and tap-changing switches. There is only one regulating winding, and there are no parallel circuits. No part of the winding is subjected to overload during the tap-changing process. The scheme gives, it is claimed, the simplest possible design of the main transformer, and the tap-changing equipment is entirely external to the main tank, thus giving facility for easy inspection. The tappings are operated by cams carried on a horizontal shaft which is housed in the enclosure A, fig 5, and driven by a small motor in the casing B. The Central Scotland transformers are arranged to give 75 per cent. of their full-load output by means of natural cooling, and for the higher loads an air blast is brought into play on the radiating surface automatically by means of a thermostat operated by the transformer temperature. The units are dispatched to site by rail in their own tanks and full of oil, so that no drying out on site is necessary, and the minimum amount of work is required to put them into commission. Fig. 5 shows a 15,000-kVA, 132-kV, 3-phase transformer, with on-load tap-changing equipment, ready for dispatch.

The company is also building a large number of 33-kV transformers for the schemes in South-East England, Central England and North-West England. All these transformers are completely self-cooled, and all have on-load tap-changing equipment on the 33-kV side. During the past few years the company has intensively developed induction regulators and at the present time a very large number are going through the works. There is one order for fifteen units for Australia, each unit being arranged to automatically control a 1,750-kVA, 6,600-volt, 3-phase feeder. Further orders in hand for Australia include regulators for use on 3,600-kVA feeders. The company claims to have built the largest twin-unit induction regulators ever manufactured.

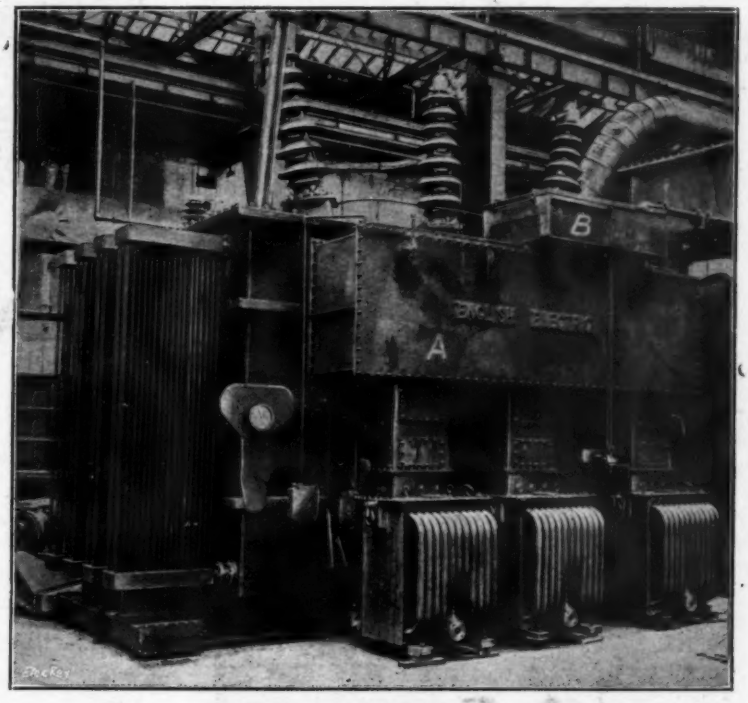


Fig. 5.—15,000-kVA, 132-kV, 3-phase Transformer.

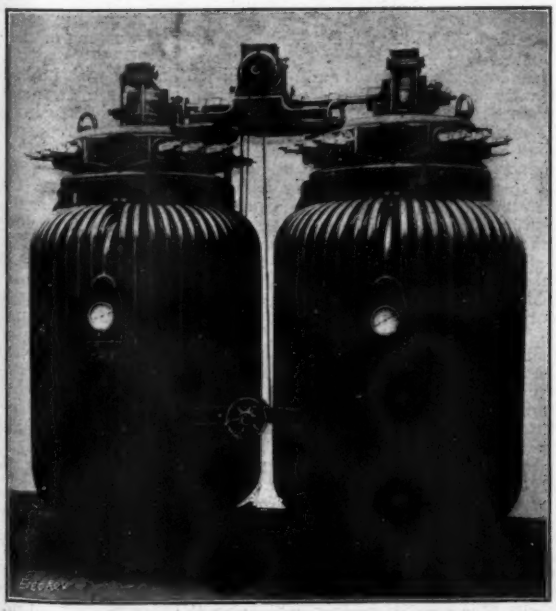


Fig. 6.—12,000-kVA, 11,000-V, Twin-unit Induction Regulator.

These regulators, fig. 6, give plus and minus 10 per cent. regulation on 12,000-kVA, 11,000-volt, 3-phase feeders. At the present time several regulators of the single-unit type are being manufactured to give plus and minus 10 per cent. regulation on 10,000-kVA, 6,600-volt feeders.

A standard line of small induction regulators suitable for controlling low-voltage distributors up to about 100-kVA capacity has also been developed in these shops. These regulators are finding a most useful application in distribution networks where the increase in domestic requirements is causing poor regulation. Not only does the use of the regulator cure the regulation trouble, but it increases the capacity of the distributor. The company has also produced equipment for giving separate regulation on the three phases of an unbalanced three-phase, four-wire system.

Report on Miners' Electric Cap Lamps.

In a Mines Department Report "On an Investigation at the Mines Department Testing Station, Sheffield, of the Safety of Miners' Electric Cap Lamps when the Battery is Short-circuited,"* by Capt. C. B. Platt, M.B.E., superintending testing officer, and Mr. G. A. Cutler, are described investigations which were carried out to determine the possibility, which is peculiar to the above type of safety lamp, of danger arising from short-circuit sparking at a fault in the flexible cable connecting the headpiece of the lamp to the battery container. It is concluded that "the danger to be apprehended from a short-circuited cap-lamp battery is probably very remote; nevertheless, the provision of an adequately designed fuse—a simple and inexpensive matter—would eliminate any possibility of an accident due to this cause."

* H.M. Stationery Office, price 2d.; post 2½d.

The International Aero Exhibition.

Some Descriptive Notes on Exhibits of an Electrical Nature.

A FEATURE of the London International Aero Exhibition, which is housed at Olympia (July 16th to 27th) and was opened by the Prince of Wales, is the striking manner in which it has been made to exemplify the history and rapid development of aeronautical engineering.

The importance of wireless communication to civil, military, and naval aircraft services is demonstrated on several stands at the show. Other applications of electricity are for engine-starting and ignition purposes, for the provision of navigation and other light on aeroplanes, and to meet the special requirements of aerodrome illumination in its varied aspects.

B.T.H. Display.

The British Thomson-Houston Co., Ltd., is showing a range of aerodrome-lighting equipment, which may be divided into two distinct groups: that required for (1) the guidance of pilots desiring to land or take off, and (2) general illumination, which includes the lighting of hangars, forecourts, repair sheds, &c. In the first group are a 24-in. revolving beacon (fig. 1) intended for mounting on the top of a hangar, or steel tower, to act as a guide to the pilot by indicating from a distance the location of the aerodrome. The cast aluminium barrel containing a silver-glass parabolic mirror is mounted on a vertical shaft carried on ball-bearings and furnished with collector rings for supplying current to the lamp, and cam-gear flashing mechanism which permits code signals to be given. The shaft is rotated through worm-gear by a motor enclosed in the base. An automatic lamp-changer can be provided, and a beam of approximately 2,000,000 c.p. is secured with a 1,000-watt lamp.

The 180 deg. floodlight shown in fig. 2 is intended to illuminate aerodromes by the distributed method, a number of the lamps being installed along the boundary in sections controlled by separate switches, thus enabling the landing direction, according to the direction of the wind, to be indicated to the pilot.

Gas-tight and water-tight lanterns of two types, suitable for use in workshops and all situations where petrol fumes may

Fig. 1.—Aerodrome Beacon.

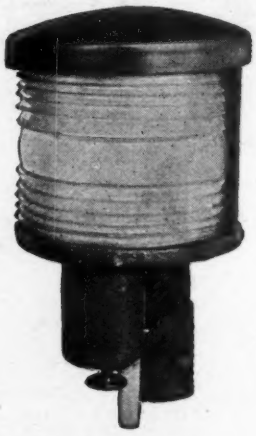


Fig. 2.—Aerodrome Floodlight.

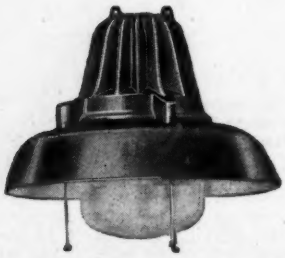


Fig. 3.—" Hermetica " Lantern.

be present, are exhibited. The " Hermetica " lantern illustrated in fig. 3 consists of a one-piece iron or aluminium casting provided with cooling fins for heat dissipation, to which is attached a vitreous-enamelled mild-steel reflector. Two globes, an inner and an outer, of clear heat-resisting glass are provided, each sealed by rubber gaskets. It is made in two sizes, accommodating gasfilled lamps of from 100 to 300 watts with which the rise in temperature will not exceed 80 deg. F. The body contains a porcelain lampholder.

B.T.H. aero-engine magnetos are made for engines having

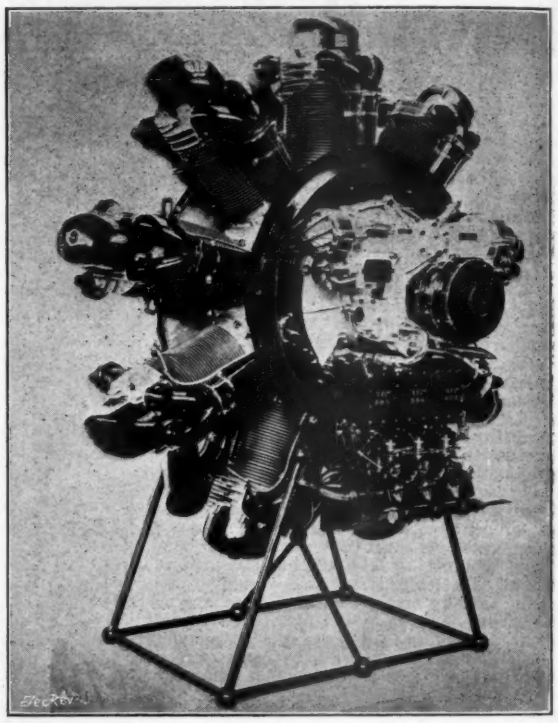


Fig. 4.—Bristol " Jupiter " Engine fitted with Inertia Starter.

any number of cylinders from 2 to 16, including the rotating-armature, polar-inductor, and two-point-ignition types. So far as is possible parts of different form, but of the same type, are made interchangeable and base and spigot mounting are provided for, many of the designs embodying screening with a metal shield to eliminate interference by the working of the magneto with radio transmission.

Hand starter magnetos are for use in conjunction with multi-cylinder magnetos provided with a trailing starter distributor brush. They are for manual operation and are installed in the pilot's cockpit of an aeroplane, the high voltage produced being led to the starting terminal of the main magneto of the engine. Impulse starters are used to facilitate the starting of the smaller aircraft engines for which it is not economical to use other methods of starting. One member is rigidly secured to the magneto spindle, the other driving member being linked to the former by a stout helical spring. When the crank-shaft is slowly rotated the two members will move together until a pawl carried by the member on the magneto spindle is held by a stop fixed to the frame of the magneto. Any further motion of the driving spindle causes the spring to be wound up, during which the armature remains stationary. After a definite movement of this member, the pawl is released and the armature then suddenly flicks over, producing by its rapid motion an intense spark which is sufficient to start the engine. When the engine commences to rotate the pawl is thrown out of action by centrifugal force and the two members rotate as a single unit.

An easy method of starting large internal combustion engines is by the use of " inertia starters," by means of which the stored energy in a small free-running flywheel is utilised for rotating the engine crankshaft. The flywheel is brought up to speed either by hand or by electric motor, and after the removal of the externally-applied power, the kinetic energy of the flywheel is transmitted to the engine. Hand cranking the starter for 30 seconds, with gradual acceleration until about 80 r.p.m. is reached, will bring the starter flywheel up to 12,000 r.p.m., when a pull on the operating rod engages the flywheel with the engine crankshaft through the gear reduction and starter jaw. In the event of the engine backfiring a

torque overload release will disconnect the drive. The electric inertia starter (figs. 4 and 5) makes one-man starting from the pilot's cockpit available, so that the engine can be cranked while the 'plane is in mid-air, and in the event of a forced landing the ability to start the engine conveniently without manual or external assistance is highly desirable. A push-and-

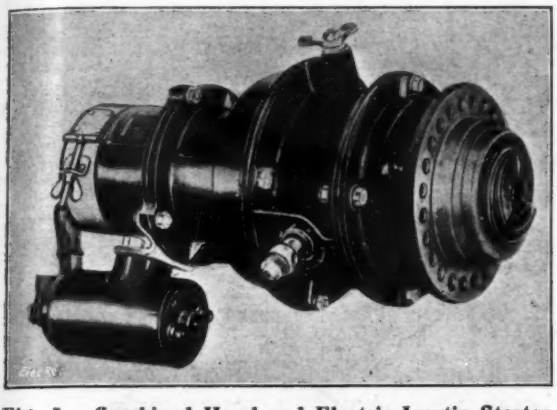


Fig. 5.—Combined Hand and Electric Inertia Starter.

pull switch in the cockpit gives remote control of the starter through a solenoid switch mounted integrally with the electric motor.

Marconi Exhibits.

At the back of the stand of Marconi's Wireless Telegraph Co., Ltd., is a scenic panorama depicting a busy scene at a commercial airport, with the control tower and directional receiving aerials in the foreground and the masts of the aerodrome transmitting station in the distance. Against this background are arranged a number of wireless sets of the kinds that have contributed so largely to the efficiency of naval, military, and commercial air services. The latest type of aerodrome transmitter, type TA1 of 4-kW, together with a model of the type-RG14 direction-finding receiver, as installed at the London air port, are a feature of the Air Ministry's exhibit on another stand. In addition, on the company's stand an aerodrome ground station transmitter (type U) stands out prominently; it is capable of transmitting messages, either by telegraphy or telephony, to aircraft in flight; of 1.5 kW power, the waverange covers 600 to 3,000 metres. Pride of place among the apparatus for aircraft must be given to the "all purpose" telephone-teleghaph type-AD.6H apparatus which is in use on civil, military, and naval aircraft in practically every country in the world. It is of 150 watts power and is suit-

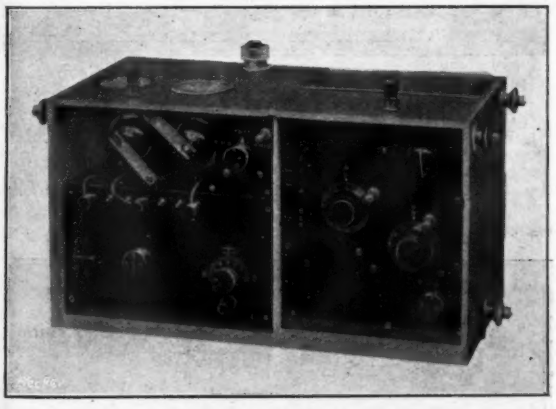


Fig. 6.—New Light Aero Radio Set.

able for transmission and reception up to distances of 100 to 300 miles. Where space is restricted and when no operator or observer is carried the set can be mounted in any part of the machine and operated by the pilot through a remote control unit. As in the case of all the Marconi aircraft sets, power is supplied by a windmill generator, which may also be used to provide current for lighting the aircraft at night and may be arranged so that in the event of a forced landing the generator may be operated by the batteries, or a light petrol engine, to enable communication to be established with the nearest ground station.

A long-range telephone-telegraph set is the type-AD.8, of 500 watts power, designed for large aeroplanes, flying boats, and airships to keep in touch with ground stations up to distances of 200 to 500 miles. The transmitter is adjustable to any wavelength between 600 and 1,500 metres and the receiver, which is mounted separately, between 600 and 4,000 metres. This type of equipment is installed on the Short "Calcutta" flying boats used by Imperial Airways, Ltd., on the England-India air route.

Among the short-wave sets the new types AD.19 transmitter and AD.20 receiver may be used with either a trailing or a fixed aerial system attached to the wings and fuselage. Their waverange is from 40 to 60 metres and the transmitter is fitted with a drive system for maintaining constancy of wave-length, while type-AD.21 is similar, but without the master drive system, and is a fixed-aerial telegraph transmitter for continuous-wave and interrupted-continuous-wave communication. Type-AD.20 receiver for both telegraphy and telephony comprises a screened-grid high-frequency amplifier, a detector, and a low-frequency magnifier.

A new "light aeroplane" set, type-AD.22, comprises a 75-watt transmitter of telephony over ranges up to 75-100 miles combined in one light case with the receiver, which is capable of receiving telephony and also telegraph signals, either continuous-wave or interrupted-continuous-wave, when required. The set can be mounted in any convenient part of the machine and should add to the popularity of the light aeroplane movement by simplifying the problems of aerial touring for business or pleasure and enabling amateur pilots to obtain very much the same weather and aerodrome report services as are available to commercial machines. It will also provide them with a means of position finding when they are flying over Europe, or other parts of the world where there are aerodrome ground stations equipped with wireless direction finders.

The set is easily operated through a remote control unit by means of Bowden wires. It is designed for a telephone wave band of from 850 to 950 metres, the international aircraft band; but a quick-change switch is provided to enable the 600-metre ship's wave-length to be resorted to in case of emergency. The total weight of the set is 63 lb. 4 oz., including the microphone and telephones, generator and propellor, accumulator, aerial, and all other accessories, while the dimensions of the transmitter and receiver box are 16 in. by 9 in. by 7 in. (see fig. 6).

One of the most important branches of wireless for aircraft operation is the application of direction finding during periods of bad visibility to enable the service to be maintained under weather conditions that would otherwise render flying impossible. This service is represented on the Marconi stand by direction-finding apparatus for aerodromes, in addition to two finders for fitting on aircraft. For aircraft on which a special operator cannot be carried a simple "homing" device is displayed, type-AD.17, which enables the pilot to steer directly towards a known wireless station by means of a loop-aerial system which, with a suitable amplifying and switch system, gives the pilot both aural and visual indication of his line of flight in relation to the station. Either type of aircraft direction finder is suitable for use in conjunction with a beacon transmitter, an example of which (type-WB.2) is shown.

Osram Valves.

The value of wireless apparatus on aeroplanes has rarely been exemplified better than in the case of the "Southern

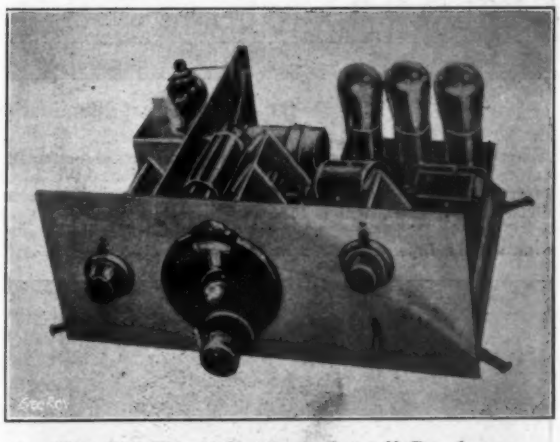


Fig. 7.—The "Southern Cross" Receiver.

Cross" which landed at Croydon recently after having flown from Australia in less than thirteen days from coast to coast. By means of the wireless equipment on board, the operator was able to receive messages throughout the flight, thus helping the pilot to a considerable extent to ascertain atmospheric and landing conditions ahead, and other very necessary details contingent upon his undertaking. The aeroplane carried a wireless receiving set (fig. 7) specially constructed by Australian manufacturers, New System Telephones Proprietary, Ltd. The set was equipped with "Osram" valves (one S.215, two DEL.410, and one DEP.410), had a wave-length of from 18 to 2,700 metres, and "Gecophone" headphones were used. The aeroplane also had "Osram" lamps installed for illumination purposes, so that the General Electric Co., Ltd., can take some credit to itself for its contribution to the success of the venture.

Graham Equipment.

A newcomer at the Exhibition is the old-established firm of Alfred Graham & Co., Ltd., well known in marine circles as

manufacturers of telephones and other apparatus for use on board ship. The firm shares a large modern factory with its sister company, Graham Amplion, Ltd., loud-speaker makers, and matters relating to aircraft equipment are under the control of Capt. D. Sinclair, late of the Air Ministry. The display includes aircraft radio apparatus as well as public speech and band-repeater equipment for use on the ground, the latter being in operation during the Exhibition and was used on the opening day to relay the speech of the Prince of Wales. The apparatus shown includes medium- and short-wave aircraft equipment with and without direction-finding apparatus, and a portable battery-operated transmitter and receiver for light-ships, survey work, &c. The company's light-aeroplane equipment incorporates what is claimed to be one of the smallest wireless sets in the world for its power.

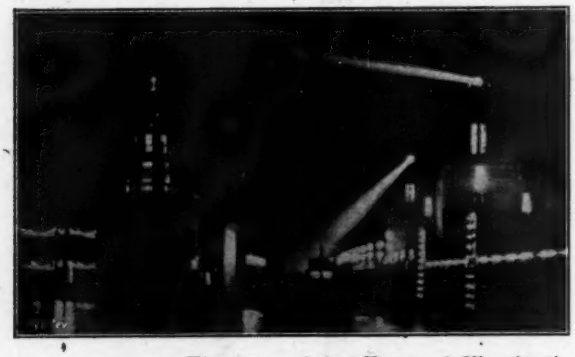
Emergency Lighting for Aerodromes.

The illumination of aerodromes obviously should be adequate and should not be subject to failure. A system designed to reduce the possibility of failure is the "Keep-alite" equipment manufactured by the Chloride Electrical Storage Co., Ltd., which is installed on a small scale at Olympia, where demonstrations of its working are frequently being given. The system provides energy for a number of auxiliary lamps fitted at carefully selected points throughout the aerodrome, all connected by special wiring, which may be of the simplest type acceptable to the insurance companies, being supplied at low pressure from a sealed-in battery. The battery is normally in permanent connection with the mains either through a resistance or a rectifier, according to the nature of the supply, *i.e.*, direct or alternating current. The maintenance of the stand-by batteries is rendered effective by trickle-charging and the instant that the main supply is interrupted through any cause a change-over contactor-switch connects the battery to the emergency lighting circuit and the lamps remain alight until the main supply is resumed, when the battery is automatically disconnected from the emergency lighting circuit and reconnected to the trickle-charging circuit. Except for special recharging after prolonged emergency, the switchgear is operated entirely automatically.

The North-East Coast Exhibition.

Some Notes on a Second Visit.

DURING a second visit to the North-East Coast Exhibition, a review of the electrical features of which we published in our issues of May 17th and 24th, we were able to see some of the exhibits which were not ready on the occasion of our first visit, and to view the show as a whole under more favourable conditions.



Figs. 1 and 2.—External Illuminations at the North-East Coast Exhibition.

There is little doubt that generally the most attractive feature is the wonderful scheme of illumination. We have referred to the standards, supplied by the British Thomson-Houston Co., Ltd., which line the roadways, each carrying two "Alabas" lanterns and a floodlight projector for illuminating the tops of the buildings.

Fig. 3.—Alfred and the Cakes.

In the shrubberies surrounding the Palaces of Industry and Engineering are hidden G.E.C. flood-light projectors. The searchlights from the towers make the scenes at night those of particular splendour. The views in figs. 1 and 2 can do no more than suggest what the real thing is like.

Credit is due to the Newcastle-upon-Tyne Electric Supply Co., Ltd., for some particularly attractive displays. Endeavours have been made by the company to present to the public in an area of some 3,500 sq. ft. the domestic applications of electricity in a new manner. On one stand a space of some 88 ft. frontage has been devoted to four tableaux which are of some historical or scenic interest, and which at the same time are associated with some domestic electrical application. For instance, one display depicting "Bruce and the Spider" shows the interior of a cave with King Bruce sitting in a corner—in the opposite corner is a spider's web, whilst through the mouth of the cave is seen the country-side in true perspective. Lighting effects are so arranged that the purple illumination, representing dawn, comes up in the far distance,

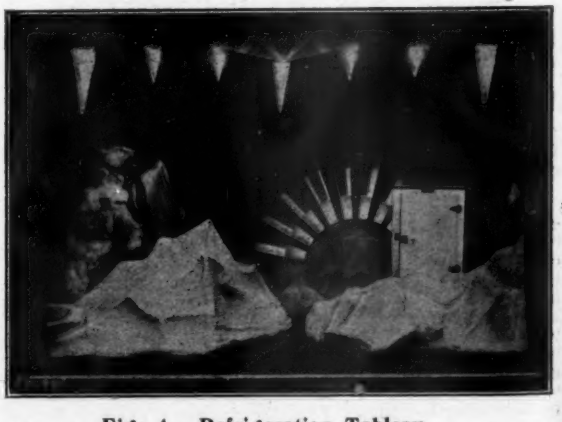


Fig. 4.—Refrigeration Tableau.

then daylight in the middle distance, and ultimately sunshine is illustrated by means of amber lighting. The final flashing arrangement extinguishes the aforementioned lighting and leaves the cave in comparative darkness, whilst a spotlight becomes illuminated behind the spider's web, bringing into prominence an electric vacuum cleaner. Another scene, fig. 3, shows "Alfred and the Cakes."

The purpose in introducing these scenic tableaux is to suggest that the whole trend of history might have changed with the introduction of electrical domestic apparatus at an earlier date. Another tableaux shows the "North Pole" complete with refrigerator "icebergs" and a polar bear with lifelike movements, together with a very true representation of the flashing lights of the Aurora Borealis, fig. 4, while a further display shows in a spectacular manner the "Evolution of

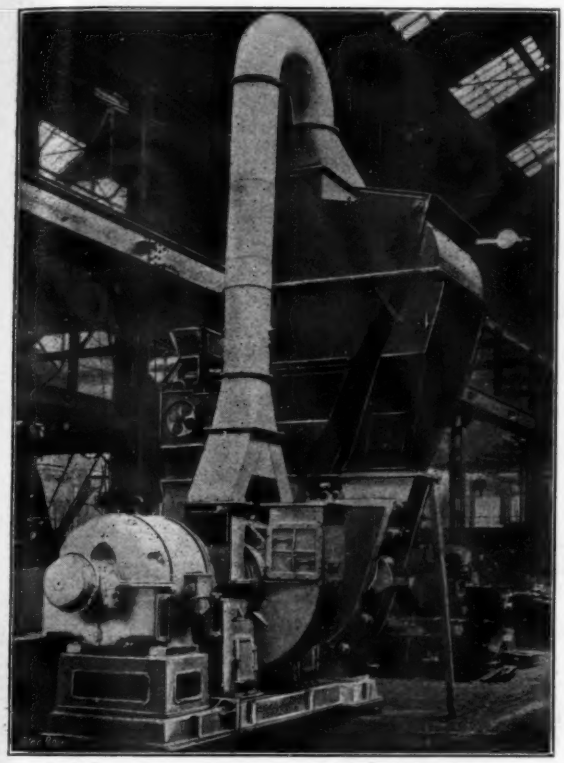


Fig. 5.—Clarke, Chapman No. 5 "Resolutor" Pulveriser.

Light," wherein by gradually increasing the intensity of illumination the stages from the pre-historic flint, *via* the Egyptian lamp, oil, candles, &c., to a 500-watt gasfilled lamp are depicted.

One thousand square feet of space is reserved as a rest lounge and inquiry bureau near which an electric fountain, with the water constantly changing colour.

Features to attract attention on the rest lounge are "mirrors" which, when the light is projected from behind, become transparent. A further stand is the "ancient and modern idea," in which bathrooms and dining rooms are in contrast. This is an old scheme for exhibition purposes, but in this particular case some entirely new features have been introduced into even the "modern" rooms. The remainder of the space employed by the company is devoted to "selling area." It is of interest to note that the Newcastle Supply Co. proposes shortly to arrange for an agricultural display in the Palace of Engineering.

A feature of interest in connection with the displays of the Newcastle Supply Co. is that the "electric service" idea is driven home. Each of the stalls have outlined in lamps round the top the words "Electric Service." Another important point with which we were impressed was the credit given by the company to the public for intelligence. "Shouting" is eliminated, and various "selling pulls" are left to the imagination of the public and the prospective consumer; for instance, on the domestic-appliance stand there is a dump of old flat and box irons, suggesting their obsolete character.

A feature of the exhibition generally is the "scene changing" which is being effected by a number of the exhibitors. Messrs. Robson & Coleman should be given credit in this connection. They are showing a 6-kW crude-oil "Crossley" engine, complete with a "Holmes" dynamo and switchboard, suitable for country-house lighting, and also a 1½-kW set with a paraffin "Crossley" engine and a "Holmes" dynamo and switchboard. These plants may be seen in operation, as may an electric drill, a sheep shearer, horse clipper, an all-electric wireless set, a sun-ray medical lamp and a large amount of small electric lamp apparatus suitable for country-house use. The lighting of this stand is of special interest; it is illuminated on the latest ceiling and panel lighting systems, with modern type fittings. This company has also on show a number of "Pellon" radiators, products of the British Electrical and Manufacturing Co.

Fig. 5 shows the No. 5 "Resolutor" pulveriser, an item of particular interest which may be seen on the stand of Messrs. Clarke, Chapman & Co., Ltd. It is capable of dealing with ten tons of coal per hour at a shaft speed of 960 r.p.m., and is driven by a 180-h.p. motor.

A very interesting display of electrical pyrometers may be seen on the stand of Messrs. Negretti & Zambra, Ltd., and Messrs. Kelvin, Bottomley & Baird, Ltd., are showing some interesting ultra-violet ray equipment.

An attractive exhibit is a marine-type Diesel engine made by Messrs. Doxford & Sons, Ltd., which is being motored round electrically. On the stand of the British Broadcasting Corporation is an interesting model of the 5XX station. Our attention was drawn to a useful display of mining-type iron-clad switchgear by Messrs. James Dawkins, Ltd.

Demonstrations are continually being given by Messrs. J. H. Holmes, Ltd., of d.c. welding. For this purpose they have installed a differentially wound compounded welding set. After the initial "kick" the current falls to a reasonable overload on sustained short-circuit, depending on the size of the electrode.

The Mascarini A.C. Boiler.

Electrical Steam-raising Equipment.

THE BASTIAN METER CO., LTD., Farnham Road, Slough, has placed on the market the Mascarini a.c. boiler. The boiler is of the electrode type, *i.e.*, the current passes from the electrodes immersed in water through the water itself which acts as the resistor. The electrodes are joined to the supply mains through various apparatus, which regulates the current, and are controlled by a 3-pole switch. To operate the boiler all that is necessary is to start the pump allowing water to enter the boiler, and as the level rises, the water makes contact with the electrodes and the current passes. Similarly to stop, all that is necessary is to stop the feed water entering and the boiler will "go out" in a few moments. If the level in the boiler remained constant, the load would fluctuate and the boiler output would vary either in pressure or volume. To overcome this there is a special electro-magnetic relay circuit, worked from a transformer, which as the current increases operates an electro-magnetic valve on the front of the boiler, allowing feed-water to by-pass back to the well and the boiler to blow down the water to a level until the current is once more normal. It is possible to regulate the load thus to 5 per cent. If the demand suddenly ceases, the pressure increases, and normally the safety valve would operate. This, however, would be wasteful, and a valve is therefore fitted to allow the water to blow down before the safety valve lifts; the level is thus reduced, and the current decreased or cut off. Steam is obtainable in a few minutes. The boiler may be so connected that it will absorb or give up any surplus energy that may be available, as, for instance, when a motor is switched on and off at intervals. This is very

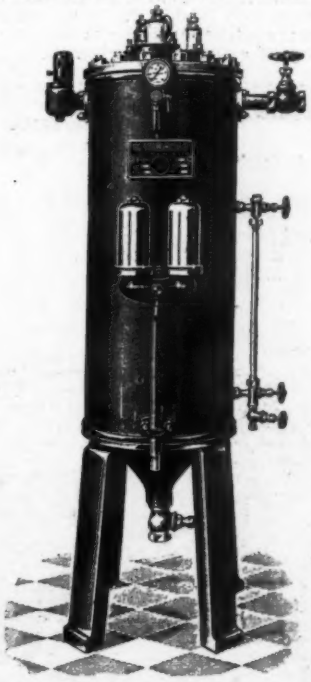


Fig. 1.—A Mascarini A.C. Boiler.

valuable where the boiler is used for factory heating or for similar purposes. It is claimed that 3 lb. of water per hour can be evaporated by 1 kWh, and that the boiler efficiency is 98 per cent. An additional advantage is the size of the boiler which, for its output, is remarkably small. The boiler, once adjusted, requires no attention. There are four types of boilers ranging from 25 kW to 300 kW.

Domestic Electrical Developments.

New Cooking, Heating, and Cleaning Devices for use in the Home.

A Domestic Appliance Connector.

The " Safegard " heat controller, fig. 1, is a bakelite moulded appliance plug incorporating a thermal strip to which varying degrees of tension can be applied by means of a small disk. This disk is easily rotated by a milled edge, and the user can set it to any desired point. The varying tension provides a wide range of temperature control, in the case of an electric iron up to approximately 580 deg. F. At any point the temperature of a domestic electrical appliance is kept even, the " Safegard " switching off automatically when the desired temperature is reached, switching on again when the temperature falls. The control is entirely independent of the user, and the device is, in addition, a protection against forgetfulness and carelessness, for should an iron to which it is fitted be left in circuit the even maintenance of temperature obtained by the switching on and off prevents a rise in temperature which would ultimately start a fire. It is estimated that one-third of the normal current used in ironing is saved by means of this device, which provides an even temperature of approximately 290 deg. F. at " medium " for average ironing, and 580 deg. F. at "hot" for heavy damp work. Independent laboratory tests have been made on a standard " Safegard " at 250 volts, a.c., 4½ A, without harm, but the device is marketed with the conservative rating of 660 watts. Present models are available for operation on any a.c. circuit from 100-250 volts.

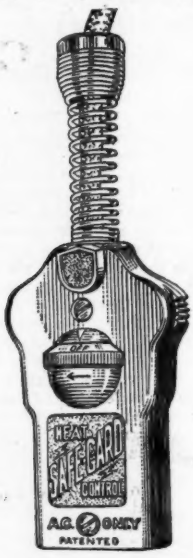


Fig. 1.—Automatic Temperature-control Plug.

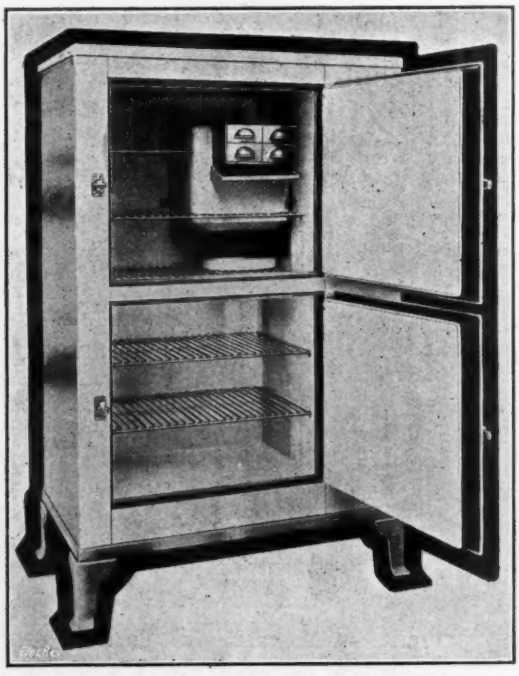
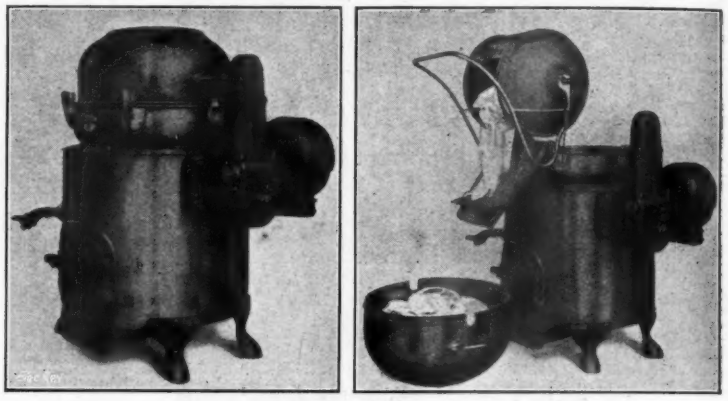


Fig. 4.—A New Model Refrigerator.



Figs. 2 and 3.—Electrically-driven Washing Machine; Closed and Open.

A Novel Washing Machine.

The accompanying illustrations, figs. 2 and 3, reproduced from the *Brown Boveri Review*, are of particular interest in that they represent a novel (so far as this country is concerned at any rate) form of electric (power only) washing machine. The machine, a product of Messrs. Merker & Co. A.-G., Baden, Switzerland, embodies a built-on single-phase motor. The drive is effected through a reversing gear which converts the uniform rotary movement of the motor into a continuous reciprocating motion of the drum. The lower part of the machine is a boiler.

An Improved Refrigerator.

The " Manor " model refrigerator, fig. 4, has been introduced by ELECTROLUX, LTD., 153-155, Regent Street, W.1, to replace the " Household " model. The new design is of white-enamelled steel with rounded corners. No metal edging is fitted. The cabinet stands on feet 7 in. high. The unit is self-contained in the cabinet, so that no hood is necessary as in the old " Household " model. The interior is finished in porcelain enamel. A feature of the interior design is that the rubber gasket on the door is so arranged that there is no wood in contact with the interior of the cabinet. The shelves are of a new and stronger construction. The refrigeration unit is an improved type of the standard short unit. It is fitted with the star radiator as at present fitted in the model " H," giving, it is claimed, increased efficiency. Four ice drawers are fitted above the radiator. A porcelain enamel covering is fitted round the radiator. The insulation consists of 3½ in. of slab cork. Temperature control is provided by means of the " Mercoid " thermostat.

Electrically-equipped Artisans' Dwellings.

Proof that electric cooking in artisans' dwellings is popular is furnished in a convincing way at Tilbury. The local District Council, within a period of approximately eighteen months, has equipped no fewer than 950 of these dwellings with standard " Magnet " cookers, and independent inquiries have shown that in practically all cases users express entire satisfaction with them. The cookers are installed free by the Council, and no hiring charges are made—provided the standard cooker is put in; if a larger type of cooker is required a nominal hiring fee is charged of 2s. 6d. per quarter. Not only have the cleanliness and the facility of cooking electrically made a favourable impression on the occupants of these dwellings, but they are also appreciative of the economy of this way of cooking. In the case of one family of five, with the cooker in use every day, the average weekly cost is only 4s.; another family, of the same number, making use of the cooker even in a much greater way, reports that the average weekly cost is

5s. 6d.; two families of six pay 5s. and 6s. average weekly, in both instances the oven being in use to a considerable extent. It is further of interest to learn that the majority of these artisans are employing electricity for purposes additional to light and cooking. With few exceptions the dwellings are equipped with "Magnet" irons, kettles, and pedestal heaters, while the "Magnet" cleaner included in the equipment of the Council's showrooms is almost continuously out on hire for day periods. The standard tariff for lighting is 6d. and for heat and power 1½d., but an "all-purpose" domestic rate has been instituted on the basis of 2d. per unit, with a rebate of ½d. per unit to consumers of more than 1,440 units per annum. As an example of the hire-purchase system in vogue it is of interest to record that even electric shades and fittings can be purchased on an instalment basis: goods to the value of £1 10s. can be paid for at the rate of sixpence per week, and of the value of £3 at the rate of 9d. per week.

Reviews.

Transactions of the Fuel Conference, London, 1928. Three Vols. Pp. 3,856+clii, with index volume. London: Percy Lund, Humphries & Co., Ltd. Price £12.

At the World Power Conference Sectional Meeting in London last autumn, delegates from 48 nations were present to discuss problems relating to the development and efficient utilisation of the fuel resources of the world. Doubtless one result will be closer co-operation between those who are carrying out research work on fuel in different countries. The combined effort expended in producing the papers may be imagined from the fact that the Transactions occupy three volumes and an index volume. Nearly 170 papers were presented, representing the views and experiences of eminent technicians of twenty countries. The importance to Great Britain of the subject matter needs no emphasis, especially in view of the fact that about two-thirds of the papers deal with coal in some form. The scope of the papers is very wide, including such subjects as the composition and classification of coal, the use of coal as a fertiliser, storage and handling of liquid fuels, high- and low-temperature carbonisation, utilisation of fuels for steam generation, and the training of fuel technicians, to mention only a few of the groups.

The majority of the papers are printed in English, the remainder being in French or German. Each paper is followed by a brief résumé in another language, and adequate use is made of tables, diagrams, photographs and maps. The papers are grouped in about twenty sections according to their subject matter. A general report is printed after each section, and these reports form a very useful guide to the contents of the various papers. The papers of each section were discussed at the Conference *en bloc*, and a report of the discussion follows the general report. The discussions are in some cases disappointing, due largely, no doubt, to the number of papers covered in each case. This difficulty appears to be inevitable when such a large number of papers is involved; probably the language difficulty was also partly responsible. The sequence of the sections does not seem to be quite logical in some respects; for example, sections dealing with the oil industry separate those on coal treatment and carbonisation, and low-temperature carbonisation is found in mixed company in Volume III. This is not an important point considering the Transactions as a whole, since there is a separate index volume with adequate cross-references, but we feel that there must be a very large number of individuals who would have purchased a single volume dealing with the subjects in which they are most interested, but who will not be able to afford £12 for the purchase of the complete set.

The Conference did not deal in any way with the winning of fuels, but concentrated chiefly on the economic aspects of their preparation and utilisation. Considerable attention was given to the examination and testing of fuels, and there was a unanimous demand for international standards to be established. It is interesting to note that there is a strong feeling in Germany in favour of the use of the "net" calorific value, whereas in this country and in America many engineers are desirous of expressing results in terms of the "gross" value. The fuels considered cover a wide range, including wood refuse, peat, lignite and brown coal, bituminous coal, anthracite, oil, power alcohol, and gas. Electricity is also considered as a fuel in certain connections. Considerable attention is devoted to the use of low-grade fuels, either in the raw state or after suitable pre-treatment. Some of these are not used in this country, but there is much to be learnt from the methods adopted for their economic use abroad, and the information is, of course, very important to manufacturers for export purposes. Some of the information regarding present-day practice in this country is by no means new to us, but the papers afford a valuable opportunity of comparing our methods and state of development with those obtaining abroad.

In contrast to the direct use of low-grade coal is the cleaning of coal, on which there are five papers. Some of these papers deal with the cost of cleaning, but it is a pity there is no paper dealing with the economics of coal cleaning, both from the points of view of the cost to the colliery, and the benefit to the consumer. The depressed condition of the world's coal industry makes it difficult to obtain an economic price for clean coal. Although there is a reference to briquetting in the contents, there is no paper on this subject, which has received more attention on the Continent and in America than in Great Britain. The carbonisation industry, which may be divided into two sections according to whether the most important product is gas or metallurgical coke, receives a good share of attention. The present position of low-temperature carbonisation is reviewed, and developments in the direction of combining this method of fuel pre-treatment with electricity generation are described. This is of very great importance to us, as it may lead to the substitution of home-produced oils for part of the enormous quantities now imported.

There are papers on the oil industry, internal-combustion engines, pulverised fuel for boilers and industrial furnaces, training of fuel technicians, transmission of power, and other subjects too numerous to mention. Even the layman is catered for, as there are papers on the use of fuels, including electricity, for domestic purposes. The individual papers are of a high standard and merit careful study. We feel that it would have been fairer in the case of papers more or less devoted to the description of commercial processes to mention the firms as well as the technical institutions to which the authors belong. This course is adopted in American technical papers, and it has much to commend it. A gathering such as the Fuel Conference will not fully achieve its purpose unless the papers and discussions reach wider audiences than those present at the actual meetings. It is to be hoped that there will be no deficiency in this respect in the present instance, and we can confidently recommend the Transactions to all who are interested in the production and utilisation of fuels.

R. H. ALLEN.

Power Resources of the World. Compiled by HUGH QUIGLEY for the International Executive Council, World Power Conference, with a preface by D. N. DUNLOP, O.B.E. Pp. xii+170; tables, XXXVII. London: World Power Conference. Price 21s. net.

This is a review of the existing publications on the subject of world power resources, together with a certain amount of correlation of the results and criticism or suggestions as to the methods employed. It aims, in the first place, at seeing what has already been done in the way of a world survey, and to what extent this can be considered as satisfactory. In the second place, it aims at suggesting suitable bases for future investigations. It is obvious that no one person or committee, in fact no one nation, can carry out the task of surveying the world and its power resources. These surveys of coal and oil fuel, water power possibilities, &c., must largely be made locally by those concerned in the actual task of power production or planning for future production. What is important, therefore, is to establish some standard method of investigation which shall reconcile the present differences of standpoint and treatment.

The data surveyed in the present work includes papers presented to two international conferences (the First World Power Conference of 1924, and the International Economic Conference of 1927) together with the principal publications on the subject which have appeared since 1924, the bibliography of which alone occupies nearly half the present volume. To review such a book is like reviewing "Bradshaw"—in some respects worse, since it is at least possible to say *where* the trains are going, whereas it is very difficult to discover the direction taken by many of the figures here presented. But certain general conclusions may be mentioned. As regards the bases and methods of the various papers surveyed, the authors find an almost insuperable divergence and lack of agreement. It is therefore not surprising that the figures which result do not agree with each other, and that the authors have sometimes to declare that "The differences shown in these estimates are such that one can hardly attach importance to any of them." Another conclusion reached is that the question of power resources cannot be separated from that of power production, and one section of the book deals with power production in 1927, whilst another section deals with electrical power production. Apparently world coal production has been almost exactly stationary from 1913 to 1925, whilst oil, gas and water power production have risen steadily from 13 per cent. to 33 per cent. of the coal total, all being reckoned on a basis of equivalent B.th.u.'s.

As regards the actual power resources, the book deals with the three main groups—coal, oil and water. Taking coal, world estimates vary from six to eleven million million tons, giving a future life at the present rate of production of several thousand years. The authors then examine the different countries in turn, and in many cases conclude that a new survey is necessary. In the case of oil the figures are even less reliable and suggest that "any statistics that are published of oil resources are probably totally inaccurate and have their real basis in propaganda." In fact, on the figures given it would appear that with present rates of production in U.S.A., seven years would lead to complete exhaustion! The final conclusion here is that for the present no survey of oil and natural gas resources is possible or can be recommended. In the matter of water power resources, a number of surveys are available and the main difficulty is to determine the basis of comparison. The estimates vary from 138 to 240 million kW taking the minimum flow as 90 per cent. of the year and adopt-

ing a uniform figure for the efficiency of conversion. In this case, also, the book reviews the estimates, country by country, so far as this is possible.

Of the importance of such a survey there can be no question. As Mr. Dunlop well says in his introduction: "The future industrial expansion of the world, if it is to be carried out on a scientific basis, or if it is to be influenced by a broad and genuinely progressive policy, must depend on a fairly accurate conception of the resources which are available in each country and the possibilities which exist for making economic use of them." So far as can be seen the task has been excellently carried out, and only minor criticisms can be levied. There are thirty-seven tables in the book but no illustrations: it seems a pity that the authors could not have unbent occasionally and conceded something here to the popular imagination (or lack of it). One or two charts or diagrams illustrating the proportions, &c., of some of the main statistics would have made the conclusions easier to grasp. One questions also the advisability of printing the tables in the body of the text. Owing to the exigences of page composition these tables do not always appear where they should, so that it is not always clear where the figures come from. Thus there appears to be no indication whatever as to what authorities have been drawn on for Table XXXVI—one of the most interesting of the whole book. As regards the difficult task of correlation and comparison of the different estimates, something has been done but more should have been attempted. In addition to the many tables reprinted from original sources one would have liked a few summaries compiled by the authors themselves showing in tabular form how the various estimates compare. Perhaps now that these intrepid explorers have duly surveyed the ground and documented their footsteps, they will be followed by tourists who will give a more popular account!

D.J.B.

Parliamentary News.

[By Our Special Parliamentary Reporter.]

The Colonial Development Bill.

This Bill received its second reading in the House of Commons on July 17th and was committed to a Committee of the whole House. The measure provides, *inter alia*, for the appointment of a committee which will advise the Secretary for the Colonies in connection with grants or loans for the carrying out of surveys and works in certain British colonies and territories. Advances for this purpose will be drawn from a "Colonial Development Fund," and will not exceed £1,000,000 in any one year. Among the special purposes for which grants may be made are the improvement of transport and communications, the construction and equipment of harbours, the improvement of water supplies, and the development of water power and mineral resources.

In moving the second reading, Mr. LUNN, Under-Secretary for the Colonies, said that the Advisory Committee would consist of five or six men of eminence in industry and finance. The Bill received the general approval of all parties, although one member complained that there was nothing in it to ensure that contracts would be placed in this country.

Railway Electrification.

On July 16th, during a discussion on the unemployment question, Major GLYN, speaking for the railways, said that when the 1926 Electricity Act came into full force electrical energy would be available all over the country. He trusted that by its means it would be possible to electrify further portions of the railway system. If they were to get cheap electrical power it was necessary to increase the day load. The railway companies were only too anxious to co-operate in any great national schemes such as the Electricity Act provided for, but it was necessary that they should have the active assistance of the House if it were necessary for them to secure additional powers from Parliament.

On July 16th, Mr. EDE asked the Lord Privy Seal if he was prepared to consider a scheme for the electrification of the railway from Newcastle-on-Tyne to South Shields among the measures of railway development to be included in the work to be undertaken for the relief of unemployment.

Mr. MORRISON, the Minister of Transport, who replied, said that the railway companies had been asked to suggest comprehensive schemes of development and improvement, including an extension of electrification, and he would bring the suggestion to the notice of the company concerned.

American Interests in British Undertakings.

On July 16th Mr. L. SMITH asked the Minister of Transport whether, in connection with the sale of British electrical concerns to Americans, any stipulation was made as to the source of supply of electrical machinery, and, if not, whether, to avoid damage to the home market and more unemployment, he would consider the introduction of legislation to prevent such a result, especially in view of the fact that those concerns were in large part established by British Government credit.

Mr. MORRISON said he had no power to impose on any electricity supply company, whether its shares were held by British or American interests, any such stipulation as was referred to. The second part of the question raised a wide subject, which obviously could not be considered solely in relation to electricity undertakings.

Transatlantic Radio-telephony.

On July 16th Mr. LEES-SMITH, Postmaster-General, informed Mr. Day that there were now three radio-telephone circuits in commercial operation between Great Britain and the United States; the transmitters were concentrated at Rugby. The total number of calls passed over those circuits during the three months ended June 30th last was 3,881.

Haulage in Mines.

On July 16th Mr. FREEMAN asked the Secretary for Mines whether he would state the number of coal mines which used only mechanical haulage; and if he would give the number of electric storage-battery locomotives used in coal mines and a list of mines which used mechanical haulage to the total exclusion of horses and ponies.

Mr. TURNER said that in 1928 the number of mines under the Coal Mines Acts in which no horses were employed was 1,247, but that figure included many small mines where the absence of horses did not necessarily imply the presence of mechanical haulage. Most of the larger mines used some form of mechanical haulage, whether horses were also employed or not. Information as to mines which used mechanical haulage exclusively was not available. Consent to the introduction of electric storage-battery locomotives below ground had been given at 13 mines under the Coal Mines Acts.

Municipal Acquisition of Undertakings.

On July 17th Mr. WELLOCK asked the Minister of Transport if he would consider introducing legislation to enable local authorities jointly to acquire electricity distributing undertakings which operated in their area upon the termination of the power to distribute held by such undertakings in any part of the area covered by such joint local authorities.

Mr. MORRISON said that the object which Mr. Wellock had in mind could, in certain cases, be attained under the provisions of existing Orders, and in other cases could be attained by agreement. Any legislation, however, which sought to alter the existing terms of purchase provisions relating to undertakings generally would raise wide issues on which he was not prepared at present to make any statement.

Electricity Companies' Finance.

On July 17th Mr. WELLOCK asked the Minister of Transport if, in the annual statement of the Electricity Commissioners on the financial position of electricity undertakings, he would provide, in the section dealing with companies, two new columns stating, respectively, the amount of reserves capitalised during the year under review and the amount capitalised from the commencement of the company.

Mr. MORRISON said he thought it might be possible for that information to be embodied in future in the annual financial statistics, and he had asked the Commissioners to consider the suggestion.

The Changing of Inefficient Plant.

On July 17th Mr. HARDIE asked the Minister of Transport whether he was aware that through the working of the Electricity Act, 1926, in bringing the inefficient plant belonging to private enterprise into an efficient state, the cost was borne by the consumer; and whether he proposed amending legislation to protect the consumer.

Mr. MORRISON said if, as he assumed, his hon. friend was referring to the supply of new equipment in connection with the change of frequency, he would point out that the cost of the change-over was being defrayed by the electrical industry as a whole and not by individual consumers.

The Certification of Electricity Meters.

On July 19th Mr. KNIGHT asked the Minister of Transport whether he would consider the desirability of initiating legislation requiring the certification and stamping of all electricity meters.

Mr. MORRISON said he had received representations from two important local authorities, and he was in consultation with the Electricity Commissioners with regard to them.

The London Traffic Bills.

On July 17th, Sir KINGSLEY WOOD moved the third reading of the private Bills promoted by the London County Council and the Underground Group for the co-ordination of London passenger traffic. He stressed the need for some speedy remedy for the present chaotic condition of London traffic, and said that, at present, the Underground Group was unable to embark on the construction of much-needed new tube railways costing about £1,000,000 per mile. If the Bills were not passed it might be that those tubes would never be built.

The rejection of the Bills was, however, moved by Liberal and Labour members, who saw danger in what they feared would be the handing over of the L.C.C. tramways to the "Combine." They also urged that the matter should be dealt with by a public Bill.

Mr. MORRISON, the Minister of Transport, advised the House to reject the Bills. He was all in favour of co-ordination, but the question was whether the monopoly which was necessary to secure co-ordination should be in some way public, or accountable to the public, or should be a private monopoly. He did not believe that the building of the new tubes depended on the fate of these Bills. If the Bills were rejected, he would be pleased to confer with the interests concerned, without delay, and in a spirit of goodwill. The door was open to further consultation, and the Government fully accepted responsibil ty in this urgent matter.

The Bills were rejected by 295 votes to 172—majority 123.

Correspondence.

Correspondents should forward their communications **as early as possible.** *No letter can be published unless we have the writer's name and address in our possession.*

The Inspection of Installations.

Take the admirable articles in the current issue of the REVIEW on "Inspection of Installations" and in the current issue of the *Electrical Times* on "Should the Architect not be Taught Electrical Engineering," condense and reduce both to a common denominator, suggest the calling of a conference in each town of the electrical contractors, municipal and electrical authorities, and architects, agree on a consulting engineer, who must be thoroughly *au fait* with the conditions prevailing regarding electrical installation work, and you have, to my mind, what would turn out to be an absolute solution of the cut-throat competition and jerry-wiring so largely prevailing to-day.

Macsa.

July 19th, 1929.

Published Specifications.

Compiled expressly for this journal by a firm of Chartered Patent Agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings taken

1927.

34,605. "Electrolytic apparatus." J. E. Noeggerath. December 21st, 1926. (282,688.)

1928.

288. "Television and like apparatus." J. L. Baird and Television, Ltd. January 4th, 1928. (314,591.)

2,936. "Electrical condensers." Hermsdorf-Schomburg Isolatoren Ges. June 4th, 1927. (291,424.)

3,570. "Electrodeposited protective coatings for vessels." I. Ainstein. February 4th, 1928. (314,594.)

5,954. "Automatic telephone systems." Siemens Bros. & Co., Ltd., and D. A. Christian. February 25th, 1928. (314,313.)

5,977. "Electro-deposition of metals." Electro-Bleach & Byproducts, Ltd., and J. Hollins. February 25th, 1928 (314,558.)

8,806. "Controlling alternating-current motors." P. Grant and Ruston and Hornsby, Ltd. March 23rd, 1928. (314,457.)

9,007. "Asynchronous motors." Naamlooze Vennootschap Hengelosche Electrische en Mechanische Apparatenfabriek and H. A. W. Klinkhamer. July 26th, 1927. (294,563.)

9,161. "Electric arc lamps." C. S. Ashcraft. June 1st, 1927. (291,392.)

9,162. "Electric arc lamps." C. S. Ashcraft. November 23rd, 1927 (301,012.)

9,176. "Electric contacts." Associated Telephone and Telegraph Co. April 20th, 1927. (289,021.)

9,178. "X-ray apparatus for crystallographic examination and like purposes." S. G. S. Dicker (Naamlooze Vennootschap Philips Gloeilampenfabrieken). March 26th, 1928. (314,367.)

9,240. "Relay arrangements, particularly for use in automatic or semi-automatic telephone systems." Standard Telephones & Cables, Ltd., and T. S. Skillman. March 27th, 1928. (314,411.)

9,258. "Electric induction meter." Landis & Gyr Soc. Anon. April 27th, 1927. (289,436.)

9,372. "Automatic and semi-automatic telephone systems." Standard Telephones & Cables, Ltd., and E. P. G. Wright. March 28th, 1928. (314,463.)

9,373. "Glow-discharge lamps." Standard Telephones & Cables, Ltd. (Western Electric Co., Inc.). March 28th, 1928. (314,464.)

9,374. "Automatic or semi-automatic telephone systems and apparatus therefor." Standard Telephones & Cables, Ltd., and J. R. Gould. March 28th, 1928. (314,465.)

9,491. "Automatic or semi-automatic telephone systems." Standard Telephones & Cables, Ltd., G. C. Hartley, and A. H. Cameron. March 29th, 1928. (314,562.)

9,492. "Telephone systems." Standard Telephones & Cables, Ltd., J. H. E. Baker, A. H. Cameron, and I. B. Haigh. March 29th, 1928. (314,563.)

9,493. "Electric communication cables." Standard Telephones & Cables, Ltd., and W. K. Weston. March 29th, 1928. (314,564.)

9,494. "Electrolytic condensers." Standard Telephones & Cables, Ltd. (Western Electric Co., Inc.). March 29th, 1928. (314,565.)

9,503. "Electric condensers." British Thomson-Houston Co., Ltd. April 1st, 1927. (288,149.)

9,515. "Electric heating devices." J. Dornan. March 29th, 1928. (314,567.)

9,568. "Electric junction boxes and electric heating apparatus comprising the same." Young, Osmond & Young, Ltd., and C. C. Turner. March 29th, 1928. (314,570.)

9,654. "Method of, and apparatus for, measuring mechanical impedance." W. E. Beatty (Bell Telephone Laboratories, Inc.). March 30th, 1928. (314,575.)

9,668. "Brush and terminal contact mechanism of dynamo-electric machines." J. Stone & Co., Ltd., and A. E. Honey. March 30th, 1928. (314,576.)

9,673. "Impulse generators for use in telephone or like systems." Automatic Telephone Manufacturing Co., Ltd., S. R. Smith, and T. P. Preist. March 30th, 1928. (314,577.)

9,677. "Automatic circuit selectors for telephony." Tchoubritch, Derval and Co. April 11th, 1927. (288,547.)

9,700. "Electrolytic recovery of metals." S. C. Smith. March 30th, 1928. (314,579.)

9,730. "Timing instruments actuated or controlled by electric impulses." R. L. Rogers and S. Smith & Son, Ltd. March 31st, 1928. (314,582.)

9,761. "Regulators for controlling the speed of electric motors." Electrical Research Products, Inc. June 21st, 1927. (292,528.)

9,785. "Electrical heaters." A. Matthews. March 31st, 1928. (314,584.)

10,174. "Protective devices for electric circuits." International General Electric Co., Inc. April 14th, 1927. (288,631.)

10,237. "Multiple-filament electric lamps for vehicles." A. G. Smith. April 4th, 1928. (Cognate application 17,105/28.) (314,603.)

10,249. "Telephone systems." Associated Telephone & Telegraph Co. April 22nd, 1927. (289,049.)

10,256. "Methods and means for amplifying in wireless-telegraphy and telephony." J. S. C. Salmond and L. S. B. Alder. April 4th, 1928. (314,605.)

10,378. "Loud-speaking telephones and like electro-acoustic devices." I. Kitsee and D. C. Law. November 18th, 1927. (300,630.)

11,990. "Electrical switch or key lampholders." M. H. Goldstone and Ward & Goldstone, Ltd. April 24th, 1928. (314,626.)

12,116. "Automatic electric switching systems." British Thomson-Houston Co., Ltd. April 28th, 1927. (289,470.)

12,303. "Television methods and apparatus." C. Chilowsky and A. Guerbilsky. April 26th, 1927. (289,416.)

12,414. "Electrical signalling systems." Siemens and General Electric Railway Signal Co., Ltd., and F. L. Castle. April 27th, 1928. (314,629.)

12,938. "Electrical boiling and cooking apparatus." J. C. Petersen, J. Edgar, and A. J. Wares. May 2nd, 1928. (314,630.)

13,081. "Holders for electric incandescent lamps." Sun Electrical Co., Ltd., and S. A. Coleman. May 3rd, 1928. (314,632.)

13,627. "Controlling gear for electrically-propelled vehicles." English Electric Co., Ltd., and F. Morris. May 9th, 1928. (314,640.)

15,022. "Selector switches for automatic telephone systems." Telefonaktiebolaget L. M. Ericsson. May 30th, 1927. (291,352.)

15,513. "Electric or imitation fires or radiators." F. J. Wineberg. May 26th, 1928. (314,649.)

16,067. "Electric switches for the motors of spinning pots for the production of artificial silk." H. Kindermann. June 1st, 1928. (314,655.)

16,089. "Fault indicators for overhead transmission lines." G. Cluley and Associated Electrical Industries, Ltd. June 1st, 1928. (314,656.)

16,875. "Sound-reproducing instruments." British Thomson-Houston Co., Ltd., A. P. Young, and J. H. Butcher. June 11th, 1928. (314,660.)

18,795. "Contacting device for electric flashing signs." E. J. Muller. September 16th, 1927. (297,099.)

19,088. "Terminal connections for electric heating elements." Walker, Hunter & Co., Ltd., and J. Walker. July 2nd, 1928. (314,675.)

19,679. "Method of improving piezo-electric crystals." E. W. C. Russell (C. B. Sawyer). July 6th, 1928. (314,680.)

20,056. "Sound-reproducing apparatus." W. C. Bailey and W. Tweedy. July 10th, 1928. (314,683.)

20,058. "Sound-reproducing apparatus or loud-speakers." Soc. des Ateliers de Montage et d'Ebenisterie. April 28th, 1928. (310,490.)

20,201. "Horns for gramophones, loud-speakers, and the like." C. Webster. July 11th, 1928. (314,684.)

20,978. "Diaphragm for loud-speakers or the like." H. Birkbeck (W. Vollmann). July 19th, 1928. (314,691.)

23,110. "Inductance coils." J. S. Lottrup. August 11th, 1927. (295,395.)

23,442. "Brake systems for rail vehicles." A. W. Maley and E. M. Taunton. August 14th, 1928. (314,713.)

23,571. "Moving-coil loud-speakers." A. Baker. August 15th, 1928. (314,715.)

24,440. "Incandescent electric lamps and the like." C. Tourne. March 9th, 1928. (Addition to 273,293 and 280,496.) (307,702.)

26,309. "Apparatus for operating Röntgen tubes." Siemens-Reiniger-Veifa Ges. für Medizinische Technik. March 13th, 1928. (307,785.)

26,594. "Electric motor controllers." International General Electric Co., Inc. September 17th, 1927. (297,326.)

26,758. "Arc-welding apparatus." Associated Electrical Industries, Ltd. (Westinghouse Electric & Manufacturing Co.). September 18th, 1928. (314,728.)

27,115. "Protective devices." International General Electric Co., Inc. September 21st, 1927. (297,435.)

28,191. "Poking and stirring apparatus for electric furnaces." Soc. Electrométallurgique de Montricher. February 7th, 1928. (305,569.)

29,274. "Centrifugal electric switches." British Thomson-Houston Co., Ltd. October 13th, 1927. (298,641.)

30,436. "Electric bread toaster." D. L. Chandler. October 20th, 1928. (314,741.)

30,969. "Device for preventing the tilting movement of the bows of current collectors." F. Szalay. October 31st, 1927. (299,779.)

31,085. "Electric switches." British Thomson-Houston Co., Ltd. October 26th, 1927. (299,435.)

32,106. "Means for protecting the separable switch members of withdrawable switchgear from dust, dirt, and the like." Siemens-Schuckertwerke Akt. Ges. December 3rd, 1927. (301,725.)

33,392. "Telephones furnished with amplifying means." E. Hausdorf. November 15th, 1927. (300,586.)

34,436. "Electron discharge apparatus." British Thomson-Houston Co., Ltd. December 14th, 1927. (302,307.)

34,536. "Adjustable sockets for electric lamps." M. Charles. November 25th, 1927. (Addition to 278,373.) (301,086.)

36,043. "Telephone systems." Association Telephone & Telegraph Co. August 13th, 1927. (Divided application on 295,572.) (301,843.)

36,167. "Mercury-vapour rectifiers." Akt. Ges. Brown, Boveri et Cie. December 19th, 1927. (Addition to 232,260.) (302,654.)

37,017. "Strainers for the overhead lines of electric railways." Akt. Ges. Brown, Boveri et Cie. December 31st, 1927. (303,393.)

1929.

11,965. "Electro deposition of metals." Electro Bleach & By-Products, Ltd., and J. Hollins. February 25th, 1928. (Divided application on 314,558.) (314,470.)

Trade Mark Applications.

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from July 17th.:—

Rockhestos. No. 502,372. Class 8. Scientific and philosophical instruments and apparatus for useful purposes.—Standard Insulator Co., Ltd., Winsley House, Wells Street, W.1.

Honest George Graham, Inventor of Dead-Beat Escapement (lettering and design). No. 501,485. All goods in Class 9.—Kelvin, Bottomley & Baird, 16-20, Cambridge Street, Glasgow.

Centurion (design only). No. 500,369. Class 13. Tubular cases for electric flash lights.—Chase Brass & Copper Co., Waterbury, Conn., U.S.A. (British representatives: Phillips & Leigh, 15, Southampton Buildings, W.C.2.)

Isomic est Magnum, Isomic Works, New York, Berlin, Paris, London, Milano (lettering and design). No. 501,042. Class 50. Electric insulating materials.—Isomic Works, Ltd., 47, Adam Street, S.E.1.

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

ABERDEEN.—Housing scheme (260), Ruthrieston; city engineer.

ARBROATH.—Extensions at infirmary (£16,000); medical superintendent.

BARNET.—Secondary school, East Barnet; Herts. Education Committee.

BARNSLEY.—Extensions, Old Mill Lane; Yorkshire Paper Mills.

BARNSTAPLE.—Re-erection of motor works, The Square, for G. W. Brindley & Son.

BATHGATE.—Town hall (£30,000); the burgh surveyor.

BEDFORD.—120 houses, Corporation estates; borough engineer.

BISHOP'S STORTFORD.—Super cinema, South Street, for E. E. Smith.

BLYTH.—Aerodrome, Heathery Lane; borough engineer.

BOROUGHBRIDGE.—Elementary school (£11,800); West Riding Education Committee.

BOURNEMOUTH.—Cinema, Christchurch Road; Carlton Cinemas, Ltd. Additions, Boscombe Picture House, Christchurch Road; Boscombe Picture Co.

BRADFORD.—Shops, Bank Street and Barkerend Road; city architect.

CARLISLE.—Municipal aerodrome; city engineer.

CATERHAM.—Extensions, Council offices, for the U.D.C.; surveyor (returnable deposit of £2 2s.).

CHESTER.—Extensions, Dee House Ursuline Convent school (£10,674); clerk to the governors.

DIDCOT (OXON.).—Soap works, for the Cyona Co., Ltd., Aston.

DINGWALL.—Residence, with electrical work; Mackenzie and Macdonald, architects.

DORCHESTER.—Extensions, highways depôt, Poundbury Road; borough engineer.

DUNDEE.—Extension of dye works, for Stevenson Bros. (Dundee), Ltd.; the manager.

DUNSTABLE.—Police station (£10,500), for Beds. C.C.; county architect, Bedford.

EASTBOURNE.—Town hall extensions, for the T.C.; borough engineer.

EDINBURGH.—Extensions, for Edinburgh Hippodrome, Ltd.; the manager.

FEATHERSTONE.—Middle school (£15,500); West Riding Education Committee.

GLASGOW.—Conversion of Locarno dance salon into roller skating rink; the manager. Warehouse, Argyle Street (£45,000), for Marks & Spencer, Ltd.

HADDINGTON.—Extension of county buildings; the county clerk.

HOLMFIRTH.—Motor service garage, Holmfirth Motor Co.; P. N. Brown, architect.

IRISH FREE STATE (DUBLIN).—Motor-'bus garage, Sheriff Street; Great Northern Railway Co. of Ireland.
(DUNDALK, CO. LOUTH).—Motor-'bus garage; Great Northern Railway Co. of Ireland.

KEIGHLEY.—Electric lighting installation, tuberculosis dispensary; West Riding C.C.

KIRKHAM.—Extension of Poulton Street cinema; manager.

KIVETON PARK.—Extensions, isolation hospital; South Rotherham and Kiveton Park Hospital Committee.

KNARESBOROUGH.—Extensions, King James Grammar School (£17,200); West Riding Education Committee.

LEWES.—Extensions, County Hall, for East Sussex C.C.; E. A. Verger, county architect, 173, High Street (returnable deposit of £3 3s.).

LIVERPOOL.—Extension of Walker Art Gallery; city architect, Municipal Buildings.

LONDON (EAST HAM, E.).—Domestic and handicraft centre, Storey Street school, North Woolwich, for the borough

LONDON (*continued.*)

E.C.; A. T. Bridgewater, borough engineer (returnable deposit of £2 2s.). Isolation hospital extensions (£41,330), for the T.C.; borough engineer.

(WAPPING, E.).—Tenements, Wapping estate (£27,199); Building and Public Works Construction Co., Ltd., Swindon.

(HAMPSTEAD, N.W.).—Block of flats, East Heath Road; Yates, Cook & Darbyshire.

(ST. PANCRAS, N.W.).—Tenements, Ossulton Street area (£334,000); L.C.C.

(ELTHAM, S.E.).—44 houses, Chardane Road; Eley & Allen. 30 houses, Green Lane; Keven & Buen.

(LEWISHAM, S.E.).—60 flats, Winchfield Road; borough engineer.

(SYDENHAM, S.E.).—Additions, South Eastern Hospital for Children; A. S. Kilby.

(WOOLWICH, S.E.).—Secondary school, Eltham Road; L.C.C. Education Committee.

(BATTERSEA, S.W.).—Extensions, infirmary, Ousley Road (£85,000); Wandsworth Board of Guardians.

(TOOTING, S.W.).—Improvements, Poor Law buildings, Church Lane (£28,000); Wandsworth Board of Guardians.

(WIMBLEDON, S.W.). — Extensions, Technical Institute (£13,270), for Surrey E.C.; education architect, Kingston-on-Thames.

(HAMMERSMITH, W.).—Extensions, infirmary, Ducane Road (£100,000); Board of Guardians.

LOUGHBOROUGH.—Fire station (£10,000); W. Granger, borough surveyor.

LOWESTOFT.—Factory, Raglan Street; Steward & Patteson, Ltd.

MALDEN.—Two schools (£38,970), for Surrey E.C.; education architect, Kingston-on-Thames.

MALTBY.—Secondary school (£30,382); West Riding Education Committee.

NORMANTON.—Extensions, Grammar School (£12,564); governors.

NORTHAMPTON.—Mental colony at Broham House (£143,000); Bedfordshire and Northants. County Councils. Nurses' home, Billing Street, for St. Andrew's Hospital; governors.

OXFORD.—Housing schemes (239), South Park, for the T.C.; J. F. Richardson, city engineer (returnable deposit of £5).

PRESTON.—Housing scheme (39 houses and 16 flats), Swansea Street (deposit £2); borough engineer and surveyor.

SHARDLOW.—Electric lighting installation, Institution, for the Board of Guardians; Capt. J. Spencer, clerk.

STANLEY (Co. DURHAM).—Extensions, St. Andrew's Church (£9,000); incumbent.

STIRLING.—Motor works, for Scottish Motor Traction Co.; Bailie Thomson, managing director, Edinburgh.

STOCKGROVE (BUCKS.).—Mansion, for F. K. Kielberg.

SUTTON-IN-ASHFIELD.—Housing scheme (92), for the U.D.C.; surveyor.

SWANSEA.—100 houses, Townhill estate; borough engineer and borough architect.

SWINDON.—School (1,000 places), Pinehurst, for the borough E.C.; W. H. Bentley, clerk.

WALTON-ON-THAMES.—Housing scheme (34), Cromwell Road, for the U.D.C.; surveyor. Infants' school (£14,150), for Surrey E.C.; education architect, Kingston-on-Thames.

WATFORD.—Extensions, girls' grammar school, for the governors; Frederick Wilson, clerk, 7, Church Street (returnable deposit of £2).

WESTON-SUPER-MARE.—Church (£7,000), Clarence Park Baptist trustees; Rev. Cecil H. Thompson.

WEYMOUTH.—Maternity centre (£4,675); Drewitt & Sons.

WINDERMERE.—Office extensions, for the U.D.C.; F. Carlisle Needham, surveyor (returnable deposit of £1).

WORTHING.—Presbyterian church; trustees.

YEOVIL.—Housing scheme (203), Highfield site, for the T.C.; borough surveyor.